Appendix G

Greenhouse Gas Technical Report

ENVIRONMENTAL IMPACT REPORT NO. 627
JOHN WAYNE AIRPORT
GENERAL AVIATION IMPROVEMENT PROGRAM

APPENDIX G
GREENHOUSE GAS TECHNICAL REPORT

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TABLE OF CONTENTS

TABLE OF CONTENTS

PAGE

LIST OF TABLES

LIST OF TABLES

PAGE

LIST OF FIGURES

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1.0 INTRODUCTION

The purpose of this Greenhouse Gas Technical Report is to provide supporting documentation for the Environmental Impact Report (EIR) being prepared for the General Aviation Improvement Program (GAIP) project proposed for the John Wayne Airport (JWA or Airport) in Orange County, California. As a requirement of the California Environmental Quality Act (CEQA), this technical report identifies and assesses the potential individual and cumulative greenhouse gas (GHG) emission impacts that would result from the construction and operation of the Proposed Project and its alternatives. Three existing conditions scenarios are evaluated in this report: Existing plus No Project, Existing plus Proposed Project, and Existing plus Alternative 1.

1.1 DESCRIPTION OF PROPOSED PROJECT

The Proposed Project proposes a Full Service West Fixed-Base Operator (FBO) and a Full Service East FBO, for a total of two full service FBOs. These two full service FBOs would replace the two existing FBOs. The total aircraft storage capacity under the Proposed Project would be approximately 354 based aircraft. When compared to Existing (2016) Conditions, the Proposed Project reduces aircraft storage capacity by approximately 242 spaces (nearly 41 percent) and would accommodate 128 fewer (nearly 27 percent) general aviation aircraft than currently using the Airport. Refer to Section 3.0, Project Description, of the EIR for a complete description of the Proposed Project.

The Proposed Project would result in changes to the Airport's general aviation aircraft operations and fleet mix. Therefore, emission sources related to the change in general aviation aircraft operations and fleet mix were evaluated. These sources include aircraft operations, auxiliary power unit (APU) usage, and ground support equipment (GSE) usage. Construction activity due to the implementation of the Proposed Project was also evaluated.

The Proposed Project would replace approximately 134,000 square feet of existing, aging facilities with approximately 97,000 square feet of new and more efficient facilities. The new facilities associated with the Proposed Project would comply with the applicable building standards set forth in Title 24, Part 6 (Building Energy Efficiency Standards for Residential and Nonresidential Buildings) and Title 24, Part 11 (California Green Building Standards Code, aka CALGreen) of the California Code of Regulations. Both Part 6 and Part 11 of Title 24 are administered by the California Energy Commission (CEC) in order to create uniform building codes to reduce California's energy consumption and to provide energy efficiency standards for residential and non-residential buildings.[1] The currently applicable standards are

[1] The CALGreen Code is intended to (1) cause a reduction in GHG emissions from buildings; (2) promote environmentally responsible, cost-effective, healthier places to live and work; (3) reduce energy and water consumption; and (4) respond to the directives by the Governor. As such, implementation of CALGreen reduces construction waste; makes buildings more efficient in the use of materials and energy; and reduces environmental impact during and after construction. The potential effect of the CALGreen energy savings is estimated to reduce statewide greenhouse gas emissions by 160,000 metric tons of CO_2 equivalent per year. See California Energy Commission,

referred to as the 2016 Standards and became effective on January 1, 2017. Development associated with the Proposed Project would need to comply with then-applicable standards and, as the building standards generally are updated every three years, subsequent, more energy efficient standards may apply. Because the Proposed Project would replace less efficient, existing development with more efficient, new development, and therefore reduce building-related energy consumption and corresponding operational emissions when compared to the existing conditions, the building-related emissions (e.g., emissions resulting from electricity and natural gas consumption) of the Proposed Project were not quantified.

Similarly, as discussed in Section 4.10, Utilities, of the EIR, it is projected that the number of people using general aviation-related facilities would increase from an estimated 1,877 persons in 2016 to 1,905 persons by 2026 with the Proposed Project. Although an increase in persons is expected, additional water consumption and wastewater generation, which are a source of emissions, are not expected because the Proposed Project would result in the installation of more water-efficient appliances and plumbing fixtures at the new facilities, as compared to those that presently exist in the older buildings, in compliance with the CALGreen Code. Thus, the small increase in the number of persons would be offset by the installation of water-efficient appliances and fixtures. Therefore, water-related emissions were not estimated for the Proposed Project.

Finally, as provided in the Traffic Impact Analysis report (see Appendix H of the EIR), the Proposed Project is not anticipated to increase the number of average daily trips or trip lengths, or the quantity of vehicle miles traveled by users of the Project's general aviation facilities and amenities; therefore, operational emissions attributable to the use of passenger vehicles are not estimated in this report.

California Code of Regulations, Title 24, Part 6 (24 CCR Part 6) *2016 Building Energy Efficiency Standards for Residential and Nonresidential Buildings*, January 2017.

1.2 DESCRIPTION OF ALTERNATIVE 1

Alternative 1 proposes a Full Service West FBO, a Full Service Northeast FBO, and a Full Service Southeast FBO, for a total of three full service FBOs. The three full service FBOs would replace the two existing FBOs. The total aircraft storage capacity under this alternative would be approximately 356 based aircraft. When compared to Existing (2016) Conditions, Alternative 1 reduces aircraft storage capacity by approximately 240 spaces (about 40 percent) and would accommodate 126 fewer (about 26 percent) general aviation aircraft than currently using the Airport. Refer to Section 3.0, Project Description, of the EIR for a complete description of the Alternative 1.

Like the Proposed Project, Alternative 1 would result in changes to the Airport's general aviation aircraft operations and fleet mix. Therefore, emission sources related to the change in general aviation aircraft operations and fleet mix were evaluated; those sources again include aircraft operations, APU usage, and GSE usage. Construction activity due to the implementation of Alternative 1 was also evaluated.

Alternative 1 would replace approximately 134,000 square feet of existing, aging facilities with approximately 110,000 square feet new and more efficient facilities that comply with Title 24, Part 6 and Title 24, Part 11 of the California Code of Regulations. Development associated with Alternative 1 would need to comply with then-applicable standards and, as the building standards generally are updated every three years, subsequent, more energy efficient standards may apply. Because Alternative 1 would replace less efficient, existing development with more efficient, new development, and therefore reduce building-related energy consumption and corresponding operational emissions when compared to the existing conditions, the building-related emissions (e.g., emissions resulting from electricity and natural gas consumption) of Alternative 1 were not quantified.

Similarly, as discussed in Section 4.10, Utilities, of the EIR, it is projected that the number of people using general aviation-related facilities would increase from an estimated 1,877 persons in 2016 to 1,919 persons by 2026 with Alternative 1. Although an increase in persons is expected, additional water consumption and wastewater generation, which are a source of emissions, are not expected because Alternative 1 would result in the installation of more water-efficient appliances and plumbing fixtures at the new facilities, as compared to those that presently exist in the older buildings, in compliance with the CALGreen Code. Thus, the small increase in the number of persons would be offset by the installation of water-efficient appliances and fixtures. Therefore, water-related emissions were not estimated for Alternative 1.

Finally, as provided in the Traffic Impact Analysis report (see Appendix H of the EIR), Alternative 1 is not anticipated to significantly increase the number of average daily trips or trip lengths, or the quantity of vehicle miles traveled by users of the Project's general aviation facilities and amenities by more than one percent; therefore, operational emissions attributable to the use of passenger vehicles are not estimated in this report.

2.0 REGULATORY SETTING

This GHG assessment of the Proposed Project and its alternatives was conducted in accordance with the guidelines provided in the most recent versions of the Aviation Emissions and Air Quality Handbook[2].

2.1 SCIENTIFIC BACKGROUND

The International Panel on Climate Change's (IPCC) Fifth Assessment Report (AR5) affirms that the planet is warming and that humans beings are "extremely likely" (indicating a 95 percent certainty) to be the primary cause. Since global warming and climate change emerged publically as an environmental issue in the 1980's, the scientific evidence has grown even stronger that the climate is changing; the impacts are widespread and occurring now. This evidence includes rising temperatures, shifting snow and rainfall patterns, and increased incidents of extreme weather events.

The global average temperature has increased by approximately 1.6°F (0.9°C) above pre-industrial levels due to the release of GHGs. Scientific research indicates that an increase in the global average temperature greater than 3.6°F (2.0°C) poses severe risks to natural systems and human health and well-being. With an additional 2.0°F (1.1°C) increase in temperatures, sea levels are anticipated to rise between 1.3 and 2.6 feet (0.4 to 0.8 meters) over current levels with an upper end estimate of an increase of approximately 3.2 feet (1.0 meters).

The "greenhouse effect" is the natural process that retains heat in the troposphere, the bottom layer of the atmosphere.[3] Without the greenhouse effect, thermal energy would "leak" into space resulting in a much colder and inhospitable planet. With the greenhouse effect, the global average temperature is approximately 61°F (16°C). GHGs are the components of the atmosphere responsible for the greenhouse effect. The amount of heat that is retained is proportional to the concentration of GHGs in the atmosphere. As more GHGs are released into the atmosphere, GHG concentrations increase and the atmosphere retains more heat increasing the effects of climate change.

The Kyoto Protocol, an international agreement linked to the United Nations Framework Convention on Climate Change, has identified six gases that largely contribute to the greenhouse effect, including: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulfur hexafluoride (SF_6).[4] Chlorofluorocarbons and other chlorine or bromine-containing gases are also considered GHGs but these are also stratospheric ozone depleting substances that were phased out under the Montreal Protocol. The IPCC's AR5 report identified additional GHGs including the synthetic gases nitrogen triflouride (NF_3) and

2 Federal Aviation Administration, *Aviation Emissions and Air Quality Handbook*, Version 3 Update 1, January 2015.

3 Causes of Climate Change, Climate Change Science, USEPA, December 2016. Available on-line: https://19january2017snapshot.epa.gov/climate-change-science/causes-climate-change_.html Accessed January 2018.

4 Kyoto Protocol, Climate Change, United Nations, 2014. Available on-line: http://unfccc.int/kyoto_protocol/items/3145.php Accessed January 2018.

sulfuryl fluoride (SO_2F_2).[5] In addition, tropospheric ozone (O_3) and black carbon have been identified as important climate pollutants.

Each of the GHGs affects climate change at different rates and persists in the atmosphere for different lengths of time.[6] For example, because of the method, it absorbs infrared heat and the length of time it exists in the atmosphere, one sulfur hexaflouride molecule has the same effect as between 17,500 and 23,500 carbon monoxide molecules. The relative measure of the potential for a GHG to trap heat in the atmosphere is called global warming potential (GWP). GWP accounts for both the gases' ability to absorb energy and the lifetime of the GHG (the amount of time it remains in the atmosphere). Table 1 presents the lifetimes and GWP for the primary GHGs. The table divides the GHGs into long-lived, those that persist in the atmosphere for more than 20 years, and short-lived that persist for less than 20 years.

The distinction between short-lived and long-lived climate pollutants is important because controlling the short-lived pollutants is a promising method for limiting climate change.[7] Controlling short-lived GHGs using existing best available control technologies may reduce the probability of exceeding the 2°C barrier before 2050 by less than ten percent and by 2100 by less than 50 percent and reduce sea level rise by 25 percent.

Table 1 GHG Lifetimes and Global Warming Potentials (GWP)

Pollutant	Lifetime (years)	GWP	
		20-year	100-year[1]
Long-Lived			
Carbon dioxide (CO_2)	~100[2]	1	1
Nitrous oxide (N_2O)	114	289	298
Nitrogen trifluoride (NF_3)	740	12,300	17,200
Sulfur hexafluoride (SF_6)	3,200	16,300	22,800
Perfluorocarbons (PFC)	3,000–50,000	5,000–8,000	7,000–11,000
Short-Lived (<20 years)			
Black Carbon[3]	Days to Weeks	270–6,200	100–1,700
Methane (CH_4)	12	72	25
Hydrofluorocarbons (HFC)[4]	(<1 to >100)	~100–11,000	~100–12,000

1 The 20- and 100-year GWP estimates are from the IPCC 2007 Fourth Assessment Report (AR4) published in November 2007. The Climate Change Scoping Plan used the AR4 GWPs for the 2000-2015 emission inventory.
2 CO_2 has a variable atmospheric lifetime and cannot be readily approximated as a single number.
3 BC climate effects are highly uncertain, in large part because they depend on the conditions under which they are emitted (i.e., location and time of year). This type of uncertainty does not apply to the Kyoto greenhouse gases.
4 HFCs have a wide range of lifetimes—some long, some short by this definition. Correspondingly, they have a wide range of GWPs.

Source: Climate Change Scoping Plan, State of California, 2017.

5 AR5, Intergovernmental Panel on Climate Change, 2008. Available on-line: https://www.ipcc.ch/report/ar5/ Accessed January 2018.
6 First Update to the Climate Change Scoping Plan, State of California, 2014.
7 Ibid.

Approximately 80 percent of the total radiative forcing (i.e., the amount of heat stored in the atmosphere) is caused by three gases: carbon dioxide, methane, and nitrous oxide.[8] Furthermore, carbon dioxide, methane, and nitrous oxide are emitted by human activities as well as natural sources.[9] Since pre-industrial times (circa 1750) carbon dioxide concentrations have increased by about 40 percent, methane concentrations have increased about 150 percent and nitrous oxide concentrations have increased about 20 percent. These increases are due the use of fossil fuels, fertilizer usage and from land use and land use change. For the purpose of this analysis, consistent with the available GHG emissions estimation modeling tools and based on the types of emissions-generating sources associated with the Proposed Project, carbon dioxide, nitrous oxide, and methane are evaluated.

Carbon Dioxide (CO_2) - Human sources of carbon dioxide include the burning of fossil fuels, deforestation and cement production. There are also abundant natural sources of carbon dioxide such as wild fires, decomposition, ocean release, respiration and volcanos. In fact, the amount of carbon dioxide emissions from natural sources is much greater than from human sources. However, prior to the industrial revolution the amount of carbon dioxide produced by natural sources was completely offset by natural carbon sinks, including plants, soil, and the ocean, that remove carbon dioxide from the atmosphere. The additional emissions from human sources have upset the balance of the carbon cycle that has existed near equilibrium for thousands of years.

Nitrous Oxide (N_2O) - The primary human sources of nitrous oxide are agriculture, fossil fuel combustion, and industrial process. The main natural sources are soils under natural vegetation and the oceans. Human emissions of nitrous oxide are much greater than natural emissions and include landfills, livestock farming, as well as the production, transportation and use of fossil fuels.

Methane (CH_4) - Methane is the principle component of natural gas.[10] It is also produced biologically under anaerobic decomposition in ruminants (e.g., cows) and landfills. Methane is considered the second most important GHG due to its high GWP and the fact that methane concentrations have increased considerably as a result of human activities related to agriculture, fossil fuel extraction and distribution, and waste generation and processing. Methane is also important because it contributes to background tropospheric ozone (the bad kind) and modeling has shown tropospheric ozone concentrations change almost linearly with changes in methane emissions.[11] Tropospheric ozone concentrations have risen about 30 percent since pre-industrial times and tropospheric ozone is considered by the IPCC as the third most important GHG after carbon dioxide and methane.

Water vapor is also a GHG.[12] Water vapor is a highly active component of the climate system that responds rapidly to changes in conditions by either condensing into rain or snow, or evaporating to return to the atmosphere. The water content of the

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8 Ibid.
9 Ibid.
10 Ibid.
11 Ibid.
12 Water Vapor, Greenhouse Gases, Climate Monitoring, National Centers for Environmental Information, National Oceanic and Atmospheric Administration, 2017.

atmosphere is constantly being depleted by precipitation as well as being replenished by evaporation. Since its concentration is controlled by the climate itself, water vapor acts as a fast feedback, reacting to, and amplifying the warming provided by the forcing GHGs. Human activity does not substantially affect water vapor concentrations except at local scales.

All of the other GHGs are emitted by specific industrial activities, such as aluminum or semiconductor manufacturing, or are used as refrigerants and emitted to the atmosphere from leaks or improper handling of the substances and only encountered in specific situations.[13] The three main categories of fluorinated gases, HFCs, PFCs, and SF_6 have no natural sources and only come from human related activities. These GHGs are considered important because of their relative effect on the climate, even at low concentrations.

2.2 INTERNATIONAL REGULATORY FRAMEWORK

International Civil Aviation Organization

The International Civil Aviation Organization (ICAO) was created in 1944 to promote the safe and orderly development of international civil aviation throughout the world. It sets standards and regulations necessary for aviation safety, security, efficiency and regularity, as well as for aviation environmental protection. The ICAO serves as the forum for cooperation in all fields of civil aviation among its 191 Member States.

A comprehensive assessment concerning aviation's contribution to global atmospheric problems is contained in the Special Report on Aviation and the Global Atmosphere. This Special Report was prepared at ICAO's request by the IPCC in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer and was published in 1999. The Special Report recognized that the effects of some types of aircraft emissions are well understood, revealed that the effects of others are not, and identified a number of key areas of scientific uncertainty that limit the ability to project aviation impacts on climate and ozone. ICAO requested that the IPCC include an update of the main findings of the Special Report in its Fourth Assessment Report (AR4) published in 2007. The fourth assessment report paid greater attention to the integration of climate change with sustainable development policies and relationships between mitigation and adaptation. The AR5 was released in four parts between September 2013 and November 2014. AR5 provided a clear and up to date view of the current state of scientific knowledge relevant to climate change. It consists of three Working Group (WG) reports and a Synthesis Report, which integrates and synthesizes material in the WG reports for policymakers. The Sixth Assessment Report is expected to be finalized in 2022.[14]

In 2007, the ICAO continued to study policy options to limit or reduce the environmental impact of aircraft engine emissions and to develop concrete proposals and provide advice as soon as possible to the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC). It called for special

[13] Ibid.
[14] https://www.ipcc.ch/organization/organization_history.shtml, Accessed: March 2018

emphasis be placed on the use of technical solutions while continuing consideration of market-based measures, and taking into account potential implications for developing as well as developed countries.

The Kyoto Protocol is a treaty made under the UNFCCC. Countries can sign the treaty to demonstrate their commitment to reduce their emissions of GHGs or engage in emissions trading. The United States (U.S.) symbolically signed the Kyoto protocol in 1998. However, in order for the Kyoto Protocol to be formally ratified, it must be adopted by the U.S. Senate, which has not been done to date. The original GHG reduction commitments made under the Kyoto Protocol expired at the end of 2012. A second commitment period was agreed to at the Doha, Qatar, meeting held December 8, 2012, which extended the commitment period to December 31, 2020.[15]

A global agreement reached by the 37th Session of the ICAO Assembly in October 2010 established ICAO's objective for aviation's role in the management of climate change. It provides a roadmap for action through 2050 for the 191 Member States and invites them to voluntarily submit their action plans to reduce CO_2 emissions to ICAO by June 2012. The action plans are intended to allow Member States to showcase the specific voluntary measures they intend to take in order to improve efficiency and thereby contribute to the global environmental aspirational goals established by the Assembly.[16]

ICAO has taken immediate steps to help Member States prepare their action plans by developing guidance material and a framework for collecting, analyzing, and reporting aviation CO_2 emissions. The ICAO has also prepared a web-interface to serve as an electronic template for the submission of action plans. This web tool provides material to assist in the preparation of action plans and dissemination of information on the various measures being undertaken by Member States. In addition, ICAO held regional hands-on training workshops from May to July 2011 in its Regional Offices. These workshops allowed Member States to obtain maximum benefit from the guidance material and provide opportunities for them to help refine their material. The workshops trained participants in the use of the web interface. Twenty-four Member States have made their action plans publically available, including the U.S.[17]

The ICAO Council has adopted a new aircraft CO_2 emissions standard, which will reduce the impact of aviation GHG emissions on the global climate. The aircraft CO_2 emissions measure represents the world's first global design certification standard governing CO_2 emissions for any industry sector. The Standard will apply to new aircraft type designs from 2020 and to aircraft type designs already in-production as of 2023. Those in-production aircraft, which by 2028 do not meet the standard, will no longer be able to be produced unless their designs are sufficiently modified.

15 Kyoto Protocol, United Nations Climate Chance. Available at: http://unfccc.int/kyoto_protocol/items/2830.php, Accessed: March 2018
16 Information available at: http://www.icao.int/environmentACal-protection/Pages/action-plan.aspx. Accessed: March 2018.
17 Available at: http://www.icao.int/environmental-protection/Documents/ActionPlan/CAEP-U%20SClimateActionPlan.pdf. Accessed: March 2018.

In December 2015, Parties to the UNFCC reached a landmark agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future. The Paris Agreement's main goal is to produce action to the threat of climate change by keeping global temperatures from rising 2 degrees Celsius above pre-industrial levels and to purse efforts to limit temperature increase to 1.5 degrees Celsius above pre-industrial levels. The Agreement also makes countries adapt the impacts of climate change and to create provides funds to purse low greenhouse gas emissions and climate resilient development. The Agreement also provides transparent framework for action and support.

The U.S. signed the agreement on April 22, 2016. In October 2016, the threshold for entry into force was met and in November 2016, the agreement went into force. The Agreement received 195 signatories, with Syria and Nicaragua not signing. On June 1, 2017, the Trump Administration announced the U.S. would be withdrawing from the Paris Agreement citing the Agreement could cost the U.S. economy millions of jobs and trillions of dollars in economic output over the next several decades.[18]

2.3 FEDERAL REGULATORY FRAMEWORK

Federal Aviation Administration

2014 Climate Action Report

According to the 2014 Climate Action Report, the FAA is pursuing a comprehensive approach to reduce GHG emissions from commercial aviation through aircraft and engine technology development; operational improvements; development and deployment of sustainable alternative jet fuels; and additional policies and measures. The FAA funds diverse programs to improve aviation energy and emissions performance, and coordinates with other agencies as appropriate, including the National Aeronautics and Space Administration. Following are some examples of FAA programs:

- The Continuous Lower Energy, Emissions, and Noise (CLEEN) program is a collaborative partnership between the FAA and five aviation manufacturers to develop technologies that will reduce emissions and fuel burn, and to expedite the integration of these technologies into current aircraft.

- The Aviation Climate Change Research Initiative (ACCRI) is an FAA program that provides guidance to develop mitigation solutions based on state-of-the-art science results. The ACCRI results are key to quantifying cost–benefit analyses of various policy options. The ACCRI has reduced uncertainties, leading to overall improvement in understanding of the climate impacts of aviation. While the ACCRI does not provide mitigation solutions on its own, recently completed ACCRI Phase II results can be used to help identify effective mitigation options.

[18] Statement by President Trump on the Paris Climate Accord, June 1, 2017, Available on-line: https://www.whitehouse.gov/briefings-statements/statement-president-trump-paris-climate-accord/ Accessed January 2018.

- The Voluntary Airport Low Emissions Program (VALE) is a grant program that encourages airport sponsors to use Airport Improvement Program funds and Passenger Facility Charges to finance low-emission vehicles; refueling and recharging stations; gate electrification; and other airport air quality improvements. Under the FAA's most recent reauthorization, VALE's work is supplemented by new programs that reduce airport emissions. The FAA is creating a program where, following an assessment of airport energy requirements, the FAA may make capital grants for airports to increase energy efficiency. The FAA has also established a pilot program under which certain airports may acquire and operate zero-emission vehicles.

In addition, the FAA is a founding member of the Commercial Aviation Alternative Fuels Initiative (CAAFI). CAAFI is a public–private partnership established in 2006 with the objective of advancing alternative jet fuels with equivalent safety/performance (drop-in) and comparable cost, environmental improvement, and security of energy supply for aviation. Work through CAAFI has also expanded internationally. Fuel production capability is beginning to emerge, including a recently announced airline and fuel producer agreement.

Aviation Greenhouse Gas Emissions Reduction Plan

The Aviation Greenhouse Gas Emissions Reduction Plan, which was submitted to ICAO as the U.S. Action Plan, identifies actions and progress toward GHG emission reductions in each of the following areas:

- **Aircraft and Engine Technology Improvement:** There are multiple technology initiatives dedicated to developing technology with significantly improved fuel burn and lower GHG emissions.

- **Operational Improvements:** The FAA is overhauling the National Airspace System through the NextGen program to improve efficiency and to reduce aircraft fuel burn.

- **Alternative Fuels Development and Deployment:** The U.S. has taken significant steps during the last five years to facilitate the development and deployment of sustainable alternative aviation fuels. Future efforts are aimed at identifying new alternative fuels pathways and on commercializing fuels with up to 80 percent lower lifecycle GHG emissions.

- **Policies, Standards, and Measures:** The U.S. is pursuing a variety of policies, standards, and measures that will supplement, and in some cases support, efforts on technology, operations, and fuels in order to achieve the carbon neutral growth goal.

- **Scientific Understanding and Modeling/Analysis:** The U.S. conducts ongoing scientific research to better understand and quantify the impacts of aviation on the climate.

The Aviation Greenhouse Gas Emissions Reduction Plan estimates that these improvements in aircraft technology and air traffic operations will result in an estimated reduction of 47 million metric tons (42.6 million tonnes) of CO_2 in 2020 for all aviation in the United States, relative to a baseline year of 2010.

Supreme Court Ruling in Massachusetts et al. v. Environmental Protection Agency

In Massachusetts et al. v. Environmental Protection Agency (549 U.S. 497 [2007]), the U.S. Supreme Court held that the USEPA has authority under the Clean Air Act (CAA) to regulate CO_2 emissions from new motor vehicles. The Court did not mandate that the USEPA enact regulations to reduce GHG emissions, but found that the only instances in which the USEPA could avoid taking action were if it found that GHGs do not contribute to climate change or if it offered a "reasonable explanation" for not determining that GHGs contribute to climate change.

U.S. Environmental Protection Agency

On December 7, 2009, the USEPA issued an "endangerment finding" under the CAA, concluding that GHGs threaten the public health and welfare of current and future generations and that motor vehicles contribute to GHG pollution. These findings provide the basis for adopting new national regulations to mandate GHG emission reductions under the federal CAA. On September 22, 2009, the USEPA issued the Final Mandatory Reporting of Greenhouse Gases Rule. The rule requires annual reporting to the USEPA of GHG emissions from large sources and suppliers of GHGs, including facilities that emit 25,000 metric tons (22,675 tonnes) or more a year of GHGs. Based on the applicability criteria listed in the rule (Code of Federal Regulations [CFR], Title 40, Part 98), mandatory reporting is only required for certain large industrial and commercial sources of GHGs. (Though JWA is not required to report GHG emissions at the federal level, JWA does report GHG emissions for the Cogeneration Facility [natural gas use] to the California Air Resources Board (CARB).) On July 25, 2016, the USEPA made two findings under section 231(a)(2)(A) of the CAA that: (1) concentrations of six well-mixed GHGs in the atmosphere endanger the public health and welfare of current and future generations (the endangerment finding), and (2) GHGs emitted from certain classes of engines used in certain aircraft are contributing to the air pollution—the mix of those six GHGs in the atmosphere—that endangers public health and welfare. [19]

Section 233 of the CAA vests the authority to promulgate emission standards for aircraft or aircraft engines with the USEPA. States and other municipalities are preempted from adopting or enforcing any standard respecting aircraft engine emissions unless such standard is identical to the USEPA's standards. To date, the USEPA has not adopted GHG emission standards for aircraft engines.

However, the USEPA has adopted oxides of nitrogen (NO_x) emission standards and related provisions for aircraft gas turbine engines with thrusts rated greater than 26.7

[19] USEPA, Final Rule for Finding that Greenhouse Gas Emissions From Aircraft Cause or Contribute to Air Pollution That May Reasonably Be Anticipated To Endanger Public Health and Welfare. Available on-line: https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-finding-greenhouse-gas-emissions-aircraft Accessed March 2018.

kilonewtons that were previously adopted by the ICAO. (These engines are used primarily on commercial passenger and freight aircraft.) Included in the rule are two new tiers of more stringent emission standards for NO_x, which are known as Tier 6 standards and Tier 8 standards. The Tier 6 standards became effective for newly manufactured aircraft engines beginning in 2013. Engine models that were originally certificated beginning on or after January 1, 2014 must comply with the Tier 8 standards. Though these standards are not directly relevant to GHG emissions, these standards can influence and reduce GHG emissions over time as new aircraft engines are phased in because the standards require fuel efficiency improvements that will result in GHG emissions reductions.

U.S. Environmental Protection Agency and National Highway Transportation Safety Administration Joint Rulemaking for Vehicle Standards

In response to the Massachusetts v. EPA ruling, the Bush Administration issued an Executive Order on May 14, 2007, directing the USEPA, the Department of Transportation (DOT), and the Department of Energy (DOE) to establish regulations that reduce GHG emissions from motor vehicles, non-road vehicles, and non-road engines by 2008. On October 10, 2008, the National Highway Transportation Safety Administration (NHTSA) released a final environmental impact statement analyzing proposed interim standards for passenger cars and light trucks in model years 2011 through 2015. The NHTSA issued a final rule for model year 2011 on March 30, 2009. In addition, on May 7, 2010, the USEPA and the NHTSA issued a final rule regulating fuel efficiency and GHG pollution from motor vehicles for cars and light-duty trucks for model years 2012–2016. On May 21, 2010, President Obama issued a memorandum to the Secretaries of Transportation and Energy and to the Administrators of the USEPA and the NHTSA calling for the establishment of additional standards regarding fuel efficiency and GHG reduction, clean fuels, and advanced vehicle infrastructure. In response to this directive, the USEPA and NHTSA issued a Supplemental Notice of Intent announcing plans to propose stringent, coordinated federal GHG and fuel economy standards for model years 2017–2025 light-duty vehicles. The agencies proposed standards projected to achieve 163 grams per mile of CO_2 in model year 2025, on an average industry fleetwide basis, which is equivalent to 54.5 miles per gallon (mpg) if this level were achieved solely through fuel efficiency. California has announced its support of this national program. The final rule was adopted in October 2012 for model years 2017–2021, and NHTSA intends to set standards for model years 2022–2025 in a future rulemaking.

Heavy-Duty Engines and Vehicles Fuel Efficiency Standards

In addition to the regulations applicable to cars and light-duty trucks, on August 9, 2011, the USEPA and the NHTSA announced fuel economy and GHG standards for medium- and heavy-duty trucks, which apply to vehicles from model year 2014–2018. The USEPA and NHTSA have adopted standards for CO_2 emissions and fuel consumption, respectively, tailored to each of three main vehicle categories: combination tractors; heavy-duty pickup trucks and vans; and vocational vehicles. According to the USEPA, this program will reduce GHG emissions and fuel consumption for affected vehicles by 6 percent to 23 percent over the year 2010.
The engine efficiency and fuel standards for light-duty vehicles are exclusively set by the USEPA and CARB. The County of Orange does not have the ability to directly

regulate or reduce tailpipe emissions from aircraft, which are subject to exclusive federal oversight. However, the State of California has a number of regulatory standards in place aimed to improve engine efficiency and increase the number of zero-emission vehicles on the road.

Trump Administration

The Trump Administration is taking a different stance than previous administrations on GHG emissions and global climate change. Between January and March 2017, President Trump signed three Executive Orders seeking regulatory reform, including the review, repeal, replacement, or modification to existing GHG regulations.

Executive Order 13771

On January 30, 2017, President Trump signed Executive Order 13771 "Reducing Regulation and Controlling Regulatory Costs" which reflects the President's policy "to be prudent and financially responsible in the expenditure of funds, from both public and private sources."[20] This includes "managing the costs associated with the governmental imposition of private expenditures required to comply with Federal Regulation." The Order requires for every one new regulation issued, at least two prior regulations be identified for elimination and that the costs of planned regulations be prudently managed and controlled through a budging process.

Executive Order 13777

On February 24, 2017, President Trump signed Executive Order 13777 "Enforcing the Regulatory Reform Agenda", which directs Federal agencies to create a Regulatory Reform Task Force.[21] One duty of the task force is to evaluate existing regulations and make recommendations to the agency head regarding their repeal, replacement, or modification, consistent with applicable law. The Executive Order required the USEPA to submit a progress report to the Administrator by Mid May-2017. In April 2017, the USEPA issued a Federal Register notice on evaluation of existing regulations and received over 460,000 comments when the comment period closed.

Executive Order 13783

On March 28, 2017, President Trump signed Executive Order 13783 "Promoting Energy Independence and Economic Growth" which calls for a review of the Clean Power Plan, related rules, and NSPS for Oil and Gas, and all agencies to "review existing regulations, orders, guidance documents, and policies that potentially burden the development or use of domestically produced energy resources."[22] Executive Order 13783 also repealed energy and climate related presidential and regulatory actions, including: Executive Order 13653 of November 1, 2013, *Preparing the United States for the Impacts of Climate Change*; The Presidential Memorandum of June 25, 2013, *Power Sector Carbon Pollution Standards*; The Presidential Memorandum of November 3, 2015, *Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment*; and The Presidential Memorandum of

[20] Exec. Order No. 13771, 82 F.R. 9339, 2017.
[21] Exec. Order No. 13777, 82 FR 12285, 2017.
[22] Exec. Order No. 13783, 82 FR 16093, 2017.

September 21, 2016, Climate Change and National Security. The Executive Order also intends to have the two reports rescinded, including: The Report of the Executive Office of the President of June 2013, *The President's Climate Action Plan;* and The Report of the Executive Office of the President of March 2014, *The Climate Action Plan Strategy to Reduce Methane Emissions*.

On April 3, 2017, in accordance with Executive Order 13783, the USEPA submitted the Withdrawal of Proposed Rules: Federal Plan Requirement for Greenhouse Gas Emissions from Electric Utility Generating Units Constructed on or Before January 8, 2014; Model Trading Rules; Amendments to Framework Regulations; and Clean Energy Incentive Program Design Details.[23]

On April 4, 2017, the USEPA announced the review of three plans: (1) The Clean Power Plan; (2) Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Station Sources: Electric Generating Units; (3) 2016 Oil and Gas New Source Performance Standards for New, Reconstructed, and Modified Sources.[24] On October 16, 2017, the USEPA issued proposed repeal of The Clean Power Plan.

2.4 STATE REGULATORY FRAMEWORK

The CARB categorizes GHG generation by source into seven broad categories.[25] The categories are:

- **Transportation** includes the combustion of gasoline and diesel in automobiles and trucks. Transportation also includes jet fuel consumption and bunker fuel for ships.
- **Agriculture and forestry** GHG emissions are composed mostly of nitrous oxide from agricultural soil management, CO_2 from forestry practice changes, methane from enteric fermentation, and methane and nitrous oxide from manure management.
- **Commercial and residential** uses generate GHG emissions primarily from the combustion of natural gas for space and water heating.
- **Industrial** GHG emissions are produced from many industrial activities. Major contributors include oil and natural gas extraction; crude oil refining; food processing; stone, clay, glass, and cement manufacturing; chemical manufacturing; and cement production. Wastewater treatment plants are also significant contributors to this category.
- **Electric generation** includes both emissions from power plants in California as well as power plants located outside of the state that supply electricity to the state.
- **Recycling and waste** includes primarily landfills.

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23 Proposed Rule, 40 CFR 60, 2017.
24 USEPA, Complying with President Trump's Executive Order on Energy Independence, 2017, Available on-line: https://www.epa.gov/energy-independence, Accessed January 2018.
25 California Greenhouse Gas Emission Inventory – 2017 Edition, California Air Resources Board, June 2017. Available on-line: https://www.arb.ca.gov/cc/inventory/data/data.htm Accessed February 2018.

- **High (GWP)** emissions consist of ozone depleting substance substitutes and electricity grid SF_6 losses.
- **Forestry** emissions are due to wildfires.

California has distinguished itself as a national and international leader in efforts to address global climate change by enacting several major pieces of legislation, engaging in multi-national and multi-state collaborative efforts, and preparing a wealth of information on the impacts associated with global climate change.

Executive Order S-3-05

In June 2005, Governor Arnold Schwarzenegger issued Executive Order S-3-05, which set GHG emissions reduction targets for California and laid out responsibilities among the state agencies for implementing the Executive Order and for reporting on progress toward the targets. The targets established by the Executive Order are to reduce GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050.

California Global Warming Solutions Act of 2006 - AB 32

In 2006, California adopted the landmark California Global Warming Solutions Act of 2006, also known as AB 32.[26] AB 32 declared that global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. AB 32 directed the CARB to take a number of actions, including:

(1) Identify and adopt regulations for discrete early actions that could be enforceable on or before January 1, 2010;

(2) Identify the statewide level of GHG emissions in 1990 to serve as the emissions limit to be achieved by 2020;

(3) Prepare and approve 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, and update the Scoping Plan every five years;

(4) Adopt a regulation that establishes a system of market-based declining annual aggregate emission limits for sources or categories of sources that emit GHG; and

(5) Maintain and continue reductions in emissions of GHG beyond 2020.

[26] California Air Resources Board, Assembly Bill 32 Overview, 2014, Available on-line: https://www.arb.ca.gov/cc/ab32/ab32.htm, Accessed on January 2018.

Senate Bill 97

In 2007, Senate Bill 97 (SB 97) was adopted, requiring the Governor's Office of Planning and Research (OPR) to prepare amendments to the *CEQA Guidelines* for the feasible mitigation of GHG emissions and the effects of climate change. Furthermore, the OPR is required to periodically update these guidelines as CARB implements AB 32. In June 2008, OPR issued a Technical Advisory on CEQA and Climate Change that provided an outline of the elements needed for a CEQA GHG analysis. The amendments to the *CEQA Guidelines* implementing SB 97 became effective on March 18, 2010. Those *CEQA Guidelines* amendments clarified several points, including:

- Lead agencies must analyze the GHG emissions of proposed projects, and must reach a conclusion regarding the significance of those emissions.[27]
- When a project's GHG emissions may be significant, lead agencies must consider a range of potential mitigation measures to reduce those emissions.[28]
- Lead agencies must analyze potentially significant impacts associated with placing projects in hazardous locations, including locations potentially affected by climate change.[29]
- Lead agencies may significantly streamline the analysis of GHGs on a project level by using a programmatic GHG emissions reduction plan meeting certain criteria.[30]
- CEQA mandates analysis of a proposed project's potential energy use (including transportation-related energy), sources of energy supply, and ways to reduce energy demand, including through the use of efficient transportation alternatives.[31]

Scoping Plan

CARB adopted the first Scoping Plan required by AB 32 in December 2008. The Scoping Plan is a comprehensive plan to achieve the GHG emissions reduction targets called in AB 32. The primary elements of the plan are to expand and strengthen energy efficiency programs, achieve a statewide renewable energy mix of 33 percent, develop a cap-and–trade program, establish transportation emissions targets and establish fees. Table 2 provides a summary of the GHG emission reduction actions identified in the 2008 Scoping Plan. CARB estimated that the implementation of the Scoping Plan measures would reduce statewide GHG emissions needed to meet the 2020 limit.

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27 CEQA Guidelines § 15064.4
28 CEQA Guidelines § 15126.4(c)
29 CEQA Guidelines § 15126.2(a)
30 CEQA Guidelines § 15183.5(b)
31 CEQA Guidelines, Appendix F

Table 2 2008 Scoping Plan Measures

Cap-and-Trade Program: Implement a broad-based California cap-and-trade program to provide a firm limit on emissions. Link the California cap–and-trade program with other Western Climate Initiative Partner programs to create a regional market system to achieve greater environmental and economic benefits for California. Ensure California's program meets all applicable AB 32 requirements for market-based mechanisms.
Light-Duty Vehicle Standards: Implement adopted Pavley standards and planned second phase of the program. Align zero-emission vehicle, alternative and renewable fuel and vehicle technology programs with long term climate change goals.
Energy Efficiency: Maximize energy efficiency building and appliance standards, and pursue additional efficiency efforts including new technologies, and new policy and implementation mechanisms. Pursue comparable investment in energy efficiency from all retail providers of electricity in California (including both investor-owned and publicly owned utilities).
Renewables Portfolio Standard: Achieve 33 percent renewable energy mix statewide.
Low Carbon Fuel Standard: Develop and adopt the Low Carbon Fuel Standard.
Regional Transportation-Related GHG Targets: Develop regional GHG emissions reduction targets for passenger vehicles.
Vehicle Efficiency Measures: Implement light-duty vehicle efficiency measures.
Goods Movement: Implement adopted regulations for the use of shore power for ships at berth. Improve efficiency in goods movement activities.
Million Solar Roofs Program: Install 3,000 megawatts of solar-electric capacity under California's existing solar programs.
Medium- & Heavy-Duty Vehicles: Adopt medium- (MD) and heavy-duty (HD) vehicle efficiencies. Aerodynamic efficiency measures for HD trucks pulling trailers 53-feet or longer that include improvements in trailer aerodynamics and use of rolling resistance tires were adopted in 2008 and went into effect in 2010. Future, yet to be determined improvements, includes hybridization of MD and HD trucks.
Industrial Emissions: Require assessment of large industrial sources to determine whether individual sources within a facility can cost-effectively reduce GHG emissions and provide other pollution reduction co-benefits. Reduce GHG emissions from fugitive emissions from oil and gas extraction and gas transmission. Adopt and implement regulations to control fugitive methane emissions and reduce flaring at refineries.
High Speed Rail: Support implementation of a high-speed rail system.
Green Building Strategy: Expand the use of green building practices to reduce the carbon footprint of California's new and existing inventory of buildings.
High GWP Gases: Adopt measures to reduce high GWP gases.
Recycling and Waste: Reduce methane emissions at landfills. Increase waste diversion, composting and other beneficial uses of organic materials, and mandate commercial recycling. Move toward zero-waste.
Sustainable Forests: Preserve forest sequestration and encourage the use of forest biomass for sustainable energy.
Water: Continue efficiency programs and use cleaner energy sources to move and treat water.
Agriculture: In the near-term, encourage investment in manure digesters and at the five-year Scoping Plan update determine if the program should be made mandatory by 2020.

Source: California Air Resources Board, 2008.

In May 2014, CARB adopted the First Update to the Scoping Plan. The Update builds upon the 2008 Scoping Plan by refining existing strategies and recommendations and building upon them to define California's climate change priorities for the following five years. The Update identifies opportunities to leverage existing and new funding to further reduce GHG emissions through strategic planning and targeted low carbon investments. The Plan sets the groundwork to reach the post-2020 reduction goals. It also evaluates how to align California's long term GHG reduction strategies with other policy priorities for water, waste, natural resources, clean energy, transportation, and land use.

The 2014 First Update presents an outline of the latest understanding of climate science including increased certainty in humans' role in climate change. California's approach to climate change is discussed to provide the underlying principles for the recommendations in the Plan. The Plan looks back at the GHG emission reductions that have been accomplished to date and presents the next steps needed to achieve the long term climate goal of emissions 80 percent below 1990 levels by 2050. The Plan discusses the need for integrated and coordinated planning to achieve California's GHG emissions reduction goals, emphasizing the importance of transportation, land use and housing development planning and outlining investments needed to enable these reductions. The Update also discusses the monitoring and evaluation that will be needed to ensure successful implementation of the GHG emissions reduction policies and programs.

While the original Scoping Plan provided specific GHG reduction measures in nine different economic sectors, the 2014 First Update discusses reductions in six key focus areas (energy, transportation, agriculture, water, waste management, and natural and working lands) as well as short-lived pollutants, green buildings, and the California's Cap and Trade Program. These focus areas include multiple economic sectors and have overlapping and complementary interests that require careful coordination.

CARB subsequently published a Second Update to the Scoping Plan in December 2017, establishing a proposed framework of action for California to meet SB 32's climate target.[32] The 2017 Update proposes continuing the major GHG reduction programs, including Cap-and-Trade Regulation, the Low Carbon Fuel Standard, and implementation of clean transportation vehicles.

Executive Order B-30-15

In April 2015, Governor Edmund "Jerry" Brown issued Executive Order B-30-15, calling on California to establish a GHG emission reduction midterm target of 40 percent below 1990 levels. This reduction target complements the established GHG emission reduction target to 1990 levels by the year 2020 (as identified in AB 32) and established GHG emission reduction target of 80 percent below 1990 levels by the year 2050 (as identified in Executive Order S-3-05).

Senate Bill 32

As enacted in September 2016, Senate Bill 32 (SB 32) sets into law the 2030 reduction target for GHG emissions as written into Executive Order B-30-15.[33] Therefore, SB 32 requires CARB to develop a pathway to reduce statewide GHG emissions to 40 percent below the 1990 level by 2030.

[32] CARB, *The 2017 Climate Change Scoping Plan Update*, January 2017. Available on-line: https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf Accessed February 2017.

[33] Senate Bill 32, Available on-line: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB32 Accessed February 2018.

2.5 GHG SIGNIFICANCE THRESHOLDS

Appendix G of the *CEQA Guidelines* addresses GHG emissions. The *CEQA Guidelines* indicate that a project could have a significant impact if it would:

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

Neither CARB, the SCAQMD, nor the County of Orange have adopted quantitative GHG thresholds of general applicability. However, the SCAQMD has adopted a quantitative GHG threshold for projects where the SCAQMD is the lead agency (primarily stationary source projects), and that threshold is found in Table 3. While the SCAQMD is not the lead agency for the Proposed Project, because no other quantitative threshold of general applicability is available within this geographic region, it is appropriate to use the SCAQMD's threshold to evaluate the significance of the GAIP's GHG emissions because a metric ton of GHG is a metric ton of GHG, irrespective of the source from which it is emitted. In other words, the source of the GHG emission is not a relevant factor in determining the significance of the emission. This stationary source threshold will be used as a screening threshold to assess significance of the GHG emissions resulting from the Proposed Project and Alternative 1. Should the emissions caused by the Proposed Project exceed the identified annual threshold, it would be considered to have a potentially significant GHG impact. Non-stationary source projects with emissions greater than this threshold are not necessarily considered significant in CEQA terms.

Table 3 SCAQMD GHG Significance Thresholds

GHG Thresholds	
GHG	10,000 MT/yr CO_2EQ for industrial facilities

Note: MT/yr CO_2EQ = metric tons per year of CO_2 equivalents; ≥ = greater than or equal to; > = greater than

Source: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf Retrieved 11/20/2017

3.0 EXISTING (2016) CONDITIONS

This section describes the methodology used to calculate GHG emissions for the Existing (2016) Conditions.

3.1 WEATHER

The climate in and around the project area, as with all of Southern California, is controlled largely by the strength and position of the subtropical high-pressure cell over the Pacific Ocean. It maintains moderate temperatures and comfortable humidity, and limits precipitation to a few storms during the winter "wet" season. Temperatures are normally mild, excepting the summer months, which commonly bring substantially higher temperatures. In all portions of the basin, temperatures well above 100° F have been recorded in recent years. The annual average temperature in the basin is approximately 62° F.

3.2 EMISSIONS SOURCES

The primary sources of GHG emissions accounted for in the inventory data presented in this report include aircraft, APUs, and GSE. The following paragraphs describe the operations data used in the modeling. The Federal Aviation Administration's Aviation Environmental Design Tool (AEDT) version 2d was used to model operational GHG emissions at the Airport.

3.2.1 EXISTING (2016) OPERATIONS DATA

In 2016, there were 284,246 aircraft operations at JWA. Of these operations, 91,522 were commercial jet air carriers, 9,798 were commercial propeller aircraft, 31,712 were general aviation jets, and 3,862 were helicopter. The remaining 147,352 were propeller driven general aviation aircraft.

3.2.2 EXISTING (2016) FLEET MIX DATA

Specific aircraft types and times of operation were obtained from the 2016 JWA General Aviation Noise Ordinance database and input into AEDT. Table 4 provides a summary of the annual operations and fleet mix at JWA, organized by AEDT aircraft type, operation type, and time of day -- daytime (7:00 a.m.–6:59 p.m.), evening (7:00 p.m.-9:59 p.m.) and nighttime (10:00 p.m.–6:59 a.m.) periods.

3.2.3 EXISTING (2016) RUNWAY USE, FLIGHT TRACK UTILIZATION, AND TAXI TIME

The annual runway end utilization also was derived from JWA General Aviation Noise Ordinance database data. Table 5 summarizes the percentage of use by each aircraft category and time of day on each JWA runway. Average taxi times provided by the Airport for commercial aircraft and general aviation aircraft operations were used to model taxiing emissions at JWA.[34]

[34] Commercial aircraft were assigned taxi-in and taxi-out times of 5.8 and 9.6 minutes, respectively. General aviation aircraft were assigned taxi-in and taxi-out times of 3.6 and 6 minutes, respectively.

Table 4 Distribution of Annual Operations by Aircraft Type 2016

Aircraft Type	AEDT Type	Arrival			Departures			Total
		Day	Eve	Night	Day	Eve	Night	
LARGE AIRCRAFT								
Airbus 319-131	A319-131191_A	2,194	853	83	2,856	247	27	6,260
Airbus 320-232	A320-232202_A	816	393	122	1,299	17	15	2,662
Airbus 320-211	A320-211201_A	784	107	2	713	179	2	1,786
Airbus 321-232	A321-232212_A	174	114	3	274	6	12	582
Airbus 300-662R	A300-622RF46_A	274	6	0	1	279	0	560
Boeing 737-700	737700377_E	9,935	2,542	936	10,959	2,441	13	26,828
Boeing 737-700	737700377_A	8,965	2,294	845	10,260	1,725	119	24,208
Boeing 737-800	737800378_A	6,673	1,726	297	7,914	741	41	17,392
Boeing 756-PW	757PW572_A	719	492	77	1,091	190	7	2,576
REGIONAL JETS								
Bombardier CRJ900	CRJ9-ER9ER_E	1,015	472	161	1,567	66	16	3,298
Embraer 170	EMB170	2,060	611	14	2,164	518	3	5,370
BUSINESS JETS								
Twin Engine Regional Jet	CNA55B	1,777	236	161	1,948	145	80	4,346
Twin Engine Regional Jet	CL600	1,427	201	39	1,544	92	31	3,334
Twin Engine Regional Jet	CNA525C	1,378	158	52	1,439	108	41	3,176
Twin Engine Regional Jet	LEAR35	1,335	125	40	1,357	87	56	3,000
Twin Engine Regional Jet	GIV	1,205	183	42	1,288	110	32	2,860
Twin Engine Regional Jet	CNA560XL	1,019	114	25	1,049	79	30	2,316
Twin Engine Regional Jet	CL601	866	95	10	909	48	14	1,942
Twin Engine Regional Jet	GV	785	115	37	831	92	12	1,872
Twin Engine Regional Jet	CNA750	673	80	8	722	36	2	1,520
Twin Engine Regional Jet	CNA560U	580	109	37	652	45	29	1,452
Twin Engine Regional Jet	MU3001	586	83	55	623	38	63	1,448
Twin Engine Regional Jet	CNA680	491	62	15	520	22	26	1,136
Twin Engine Regional Jet	F10062	418	50	12	448	23	8	958
Twin Engine Regional Jet	CNA510	364	44	11	367	20	32	838
Twin Engine Regional Jet	CIT3	359	30	5	366	26	2	788
Twin Engine Regional Jet	IA1125	208	28	9	226	15	4	490
Twin Engine Regional Jet	ECLIPSE500	102	12	4	93	6	19	236
TURBOPROPS								
Commuter Prop	DHC6	1,246	153	46	1,297	39	109	2,890
Commuter Prop	CNA441	1,277	125	42	1,269	120	55	2,888
Commuter Prop	DO228	156	22	2	149	27	4	360
Commuter Prop	CNA208	1,044	121	87	1,079	112	61	2,504
Commuter Prop	DHC830	578	0	0	577	1	0	1,156
GENERAL AVIATION PROPS								
GA Prop	GASEPF	13,647	1,662	218	14,407	751	369	31,054
GA Prop	CNA172	4,482	401	74	4,469	293	195	9,914
GA Prop	GASEPV	3,056	309	92	3,184	172	100	6,912
GA Prop	BEC58P	1,393	120	16	1,408	77	46	3,060
GA Prop	CNA182	999	127	16	1,032	71	40	2,286
GA Prop	CNA206	691	55	4	723	17	10	1,500
GA Prop	PA28	439	36	8	432	42	9	966
GA Prop	PA31	139	12	1	144	6	1	302
HELICOPTER								
Helicopter	R44	1,343	110	43	1,358	95	43	2,992
Helicopter	SA350D	255	70	111	358	24	53	870
Touch and Go Ops								91,358
TOTAL ANNUAL OPS								284,246

Note: 1. Day = 7:00 a.m. to 6:59 p.m., Eve = 7:00 p.m. to 9:59 p.m., Night = 10:00 p.m. to 6:59 a.m.

2. The AEDT Type column includes aircraft type suffixes that represent the User-defined profile names.

Source: John Wayne General Aviation Noise Ordinance Database Data, January 2016-December 2016; Landrum & Brown, 2017.

Table 5 Runway End Utilization 2016

DAYTIME ARRIVALS				
AIRCRAFT CATEGORY	**02L**	**02R**	**20L**	**20R**
Large Jets	2.62%	0.00%	0.00%	97.38%
Regional Jets	2.59%	0.00%	0.00%	97.41%
Business Jets	2.40%	0.00%	0.00%	97.60%
Turboprops	2.55%	0.14%	1.97%	95.35%
General Aviation Props	0.89%	1.10%	48.34%	49.67%
DAYTIME DEPARTURES				
AIRCRAFT CATEGORY	**02L**	**02R**	**20L**	**20R**
Large Jets	3.42%	0.00%	0.00%	96.58%
Regional Jets	2.76%	0.00%	0.00%	97.24%
Business Jets	2.66%	0.00%	0.00%	97.34%
Turboprops	2.29%	0.12%	1.77%	95.82%
General Aviation Props	1.88%	0.64%	44.86%	52.62%
EVENING ARRIVALS				
AIRCRAFT CATEGORY	**02L**	**02R**	**20L**	**20R**
Large Jets	3.21%	0.00%	0.00%	96.79%
Regional Jets	3.67%	0.00%	0.00%	96.33%
Business Jets	2.70%	0.00%	0.00%	97.30%
Turboprops	2.67%	0.38%	0.00%	96.95%
General Aviation Props	1.03%	0.59%	35.23%	63.16%
EVENING DEPARTURES				
AIRCRAFT CATEGORY	**02L**	**02R**	**20L**	**20R**
Large Jets	3.06%	0.00%	0.00%	96.94%
Regional Jets	1.15%	0.00%	0.00%	98.85%
Business Jets	2.27%	0.00%	0.00%	97.73%
Turboprops	2.08%	0.64%	4.05%	93.22%
General Aviation Props	1.91%	0.37%	45.93%	51.79%
NIGHTTIME ARRIVALS				
AIRCRAFT CATEGORY	**02L**	**02R**	**20L**	**20R**
Large Jets	5.80%	0.00%	0.00%	94.20%
Regional Jets	2.99%	0.00%	0.00%	97.01%
Business Jets	4.88%	0.00%	0.00%	95.12%
Turboprops	3.68%	0.00%	2.43%	93.89%
General Aviation Props	2.69%	2.06%	15.46%	79.79%
NIGHTTIME DEPARTURES				
AIRCRAFT CATEGORY	**02L**	**02R**	**20L**	**20R**
Large Jets	6.67%	0.00%	0.00%	93.33%
Regional Jets	0.00%	0.00%	0.00%	100.00%
Business Jets	26.54%	0.00%	0.00%	73.46%
Turboprops	71.65%	3.88%	0.00%	24.47%
General Aviation Props	27.16%	0.38%	21.70%	50.75%

Note: Day = 7:00 a.m. to 6:59 p.m., Eve = 7:00 p.m. to 9:59 p.m., Night = 10:00 p.m. to 6:59 a.m.

Source: John Wayne General Aviation Noise Ordinance Database Data, January 2016-December 2016; Landrum & Brown, 2017.

3.2.4 AUXILIARY POWER UNITS

The commercial jet and general aviation aircraft use APUs while at the gate to operate the heating, air conditioning, and electric systems. The APU is also used to 'start up' or restart the aircraft engines before departing from the gate area. APU usage causes emissions and is under the control of the pilot; therefore, APU use and emissions can vary greatly from one airline to another and even one aircraft to another. Therefore, APUs are modeled by aircraft operation.

The AEDT was used to model APU usage at the Airport by assigning AEDT default APUs to each aircraft operation. AEDT estimated 21,150 annual hours of APU usage at the Airport for the Existing (2026) Condition. At the time of this writing, AEDT did not have the capability to calculate GHG emissions for APUs. Therefore, appropriate emission factors were applied to the annual APU usage to calculate annual GHG emissions outside of AEDT.[35] It should be noted, however, that a majority of commercial APU usage is electrified at JWA. Therefore, it is likely the total APU emissions presented in Section 3.3 overestimates emissions from APUs.

3.2.5 GROUND SUPPORT EQUIPMENT

GSE is used to service aircraft between flights. Typical GSE includes air conditioning, air start, baggage tractors, belt loaders, and emergency vehicles that support airport operations. The AEDT defaults were used to model the GSE usage for commercial operations at the Airport. However, it should be noted that approximately 60 percent of commercial GSE usage is electrified. Therefore, it is likely the GSE emissions attributed to commercial operations included in the estimate presented in Section 3.3 overestimates emissions from GSE. The actual general aviation GSE usage was provided by the Airport and was used to model general aviation GSE emissions in AEDT. The percentage of GSE type by fuel type and annual operating hours used in the AEDT modeling for general aviation operations in the Existing (2016) Conditions are shown in Table 6. At the time of this writing, AEDT did not have the capability to calculate GHG emissions for GSE. Therefore, appropriate load factors and emission factors were applied to the annual GSE usage to calculate annual GHG emissions outside of AEDT.[36]

[35] An APU with a horsepower rating from 100 to 175 was assumed. MOVES 2014a emission factor for an APU with horsepower rating from 100 to 175 for methane and carbon dioxide are 1.8 g/hr and 72,733.8 g/hr, respectively.

[36] ACRP Report 78: Airport Ground Support Equipment: Emission Reduction Strategies, Inventory, and Tutorial.

Table 6 General Aviation GSE – Existing (2016) Conditions

AEDT GSE TYPE	FUEL TYPE	PERCENT OF GSE TYPE USAGE	ANNUAL OPERATING HOURS
Aircraft Tractor	Diesel	44.00%	3,935
Aircraft Tractor	Electric	47.63%	4,260
Aircraft Tractor	Gasoline	8.37%	749
Cart	Electric	100.00%	125
Fuel Truck	Diesel	100.00%	4,400
GPU	Diesel	100.00%	6,000
Hydrant Truck	Electric	100.00%	100
Lavatory Truck	Electric	100.00%	728
Service Truck	Electric	100.00%	1,675
Fork Lift	Propane	100.00%	200

Source: JWA, Landrum & Brown analysis, 2018.

3.3 EMISSIONS INVENTORY

The AEDT was used to model aircraft operations at the Airport, along with GSE and APU usage. The model estimates the quantity of emissions of GHGs in metric tons per year. The Airport-wide GHG emissions inventory for the Existing (2016) Conditions is provided in Table 7.

Table 7 Airport-Wide GHG Emissions Inventory – Existing (2016) Conditions

SOURCE	ANNUAL EMISSIONS (METRIC TONS PER YEAR)			
	CO_2	CH_4	N_2O	CO_2EQ
Aircraft	104,694	0.0	0.0	104,694
GSE	7,913	0.2	0.1	7,941
APU	1,530	0.0	0.0	1,531
			Total MT CO_2EQ	***114,167***

CO_2: Carbon Dioxide
CH_4: Methane
N_2O: Nitrous oxide
CO_2EQ: Carbon Dioxide equivalent

Note: GWP for CO_2=1; CH_4= 25; N_2O=298;
APU and GSE usage is largely limited to commercial aircraft

Source: AEDT version 2d, Landrum & Brown analysis, 2018.

4.0 CONSTRUCTION ACTIVITIES

Construction estimates (including phase durations and estimated quantities) for the Proposed Project and Alternative 1 were based on the preliminary engineering data available at the time the modeling was completed for this EIR. The estimates were developed by AECOM and JWA staff. The construction phasing plans identify 15 main phases and the schedule reflects full removal and replacement of the general aviation aprons and service roads.

4.1 PROPOSED PROJECT

Construction for the Proposed Project is anticipated to take approximately eight years and is projected to start in 2019 and be completed in 2026. The Proposed Project construction phases and estimated building sizes are detailed in Table 8 and Figure 1.

4.2 ALTERNATIVE 1

Construction for Alternative 1 is anticipated to take approximately eight years and is projected to start in 2019 and be completed in 2026. The Alternative 1 construction phases are detailed in Table 9 and Figure 2.

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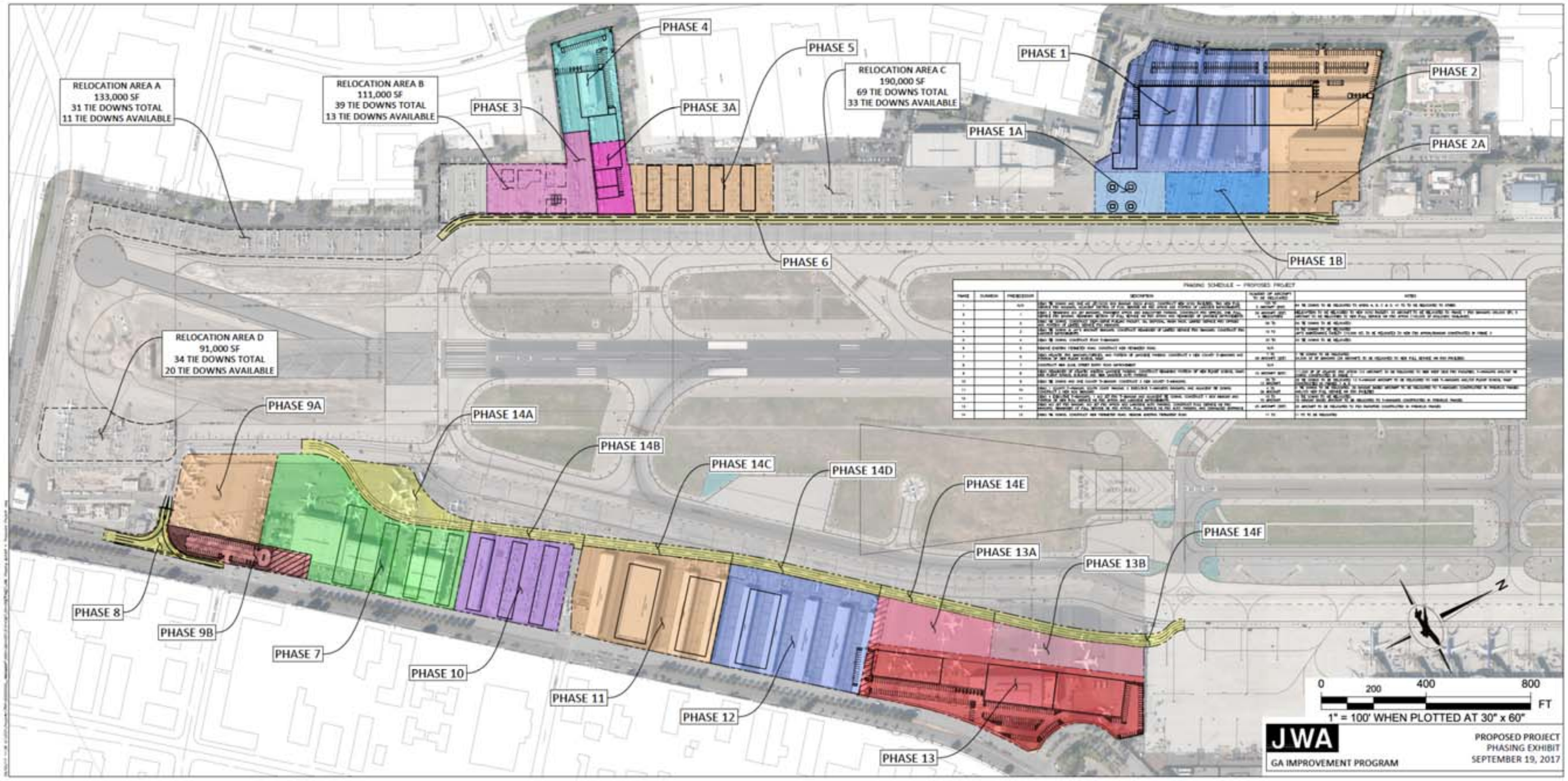
Table 8 Proposed Project Construction Phases

PHASE	ACTIVITY	DURATION (DAYS)	FOOTPRINT	UNIT
1	Barricades, Demo and Relocations	65	196,894	SF
1	Construct New Sheriff's Office	160	20,232	SF
1	Construction of FBO	110	33,000	SF
1	Construction of Apron	35	10,500	SY
1	Construction of Park Spaces / Lighting	31	9,233	SY
1A	Barricade, Demo Phase 1 A and Utility Relocation	40	42,466	SF
1A	Subgrade and Curbing	15	42,466	SF
1A	Construction of tie-down area Pavement	30	4,718	SY
1B	Barricade, Demo Phase 1 B and Utility Relocation	40	62,555	SF
1B	Subgrade and Curbing	15	62,555	SF
1B	Construction of tie-down area Pavement	30	6,951	SY
2	Barricade, Demo and Relocations	45	197,146	SF
2	Construct Office	130	29,125	SF
2	Construct FBO	110	33,000	SF
2	Construction of Apron	35	13,449	SY
2	Construction of Park Spaces / Lighting	31	7,791	SY
3-3A	Barricade, Demo and Relocations	45	127,380	SF
3-3A	Construction of FBO	115	16,793	SF
3-3A	Construct Office	75	7,378	SF
3-3A	Construction Two (2) Aircraft Service Areas	30	12,561	SF
3-3A	Construction of Apron	35	11,878	SY
3-3A	Construction of Park Spaces / Lighting	19	106,898	SF
4	Barricade, Demo and Relocations	50	78,342	SF
4	Construction of FBO	80	25,389	SF
4	Construction of Apron	35	2,719	SY
4	Construction of Park Spaces / Lighting	31	1,949	SY
4	Construction of Park Spaces / Lighting	31	1,949	SY
5	Barricade, Demo and Relocations	30	103,214	SF
5	Construction of FBO 4	45	39,200	SF
5	Construction of Apron	35	7,113	SY
6	Barricade, Demo and Relocations	10	134,505	SF
6	Demo marking	4	134,505	SF
6	Road Relocated	45	14,945	SF
6	New Marking	6	134,505	SF

PHASE	ACTIVITY	DURATION (DAYS)	FOOTPRINT	UNIT
7	Barricade, Demo and Relocations	60	184,103	SF
7	Construction of T Hangers	88	66,882	SF
8	Construction Modify Entrance Next to Phase 8 &9	110	110,478	SF
9A-9B	Barricade, Demo and Relocations	30	34,219	SF
9A-9B	Construction Trench Drains and Site Utilities	35	41,329	SF
9A-9B	Concrete	35	1,885	SY
9A-9B	Barricade, Demo and Relocations	30	17,110	SF
9A-9B	Construction of Flight School Office	75	10,000	SF
9A-9B	Construction of Park Spaces / Lighting	41	2,707	SY
9A-9B	Misc. Concrete	25	24,361	SF
10	Barricade, Demo and Relocations	30	129,433	SF
10	Construction of T- Hangers and Apron Paving	75	48,319	SF
10	Construction of Waste Oil Separator-Drum Storage Area	55	81,114	SF
10	Misc. Concrete	25	8,600	SY
11	Demo and Relocations	35	204,617	SF
11	Construction of Box Hangers and Surface Repairs	81	69,544	SF
11	Misc. Concrete	25	17,320	SF
12	Construction Box Hanger and T Hangers	75	34,761	SF
12	Apron Concrete	30	20,875	SY
12	Construction of Park Spaces / Lighting	31	189,878	SF
12	Misc. Concrete	25	2,000	SF
13	Demo and Relocations	31	355,459	SF
13	Construction of FBO Hangers	63	103,295	SF
13	Construction of Offices	90	18,000	SF
13	Construction Set up of Customs Area	30	18,000	SF
13	Construction of Park Spaces / Lighting	50	3,333	SY
13	Construction of Parking Garage	140	175,528	SF
13	Apron Concrete	45	16,728	SY
14	Demo marking	4	23,866	SF
14	East Access Road Relocation	50	2,652	SY
14	New Marking	6	23,866	SF
15	Install Traffic Signals	60	21,312	SY
15	New Marking	1	191,807	SF

Source: AECOM, John Wayne Airport, 2017.

Figure 1 Construction Phasing – Proposed Project



Note: Sub-phases shown in the diagram may be grouped together in the construction phasing table.

Source: AECOM, John Wayne Airport, 2017.

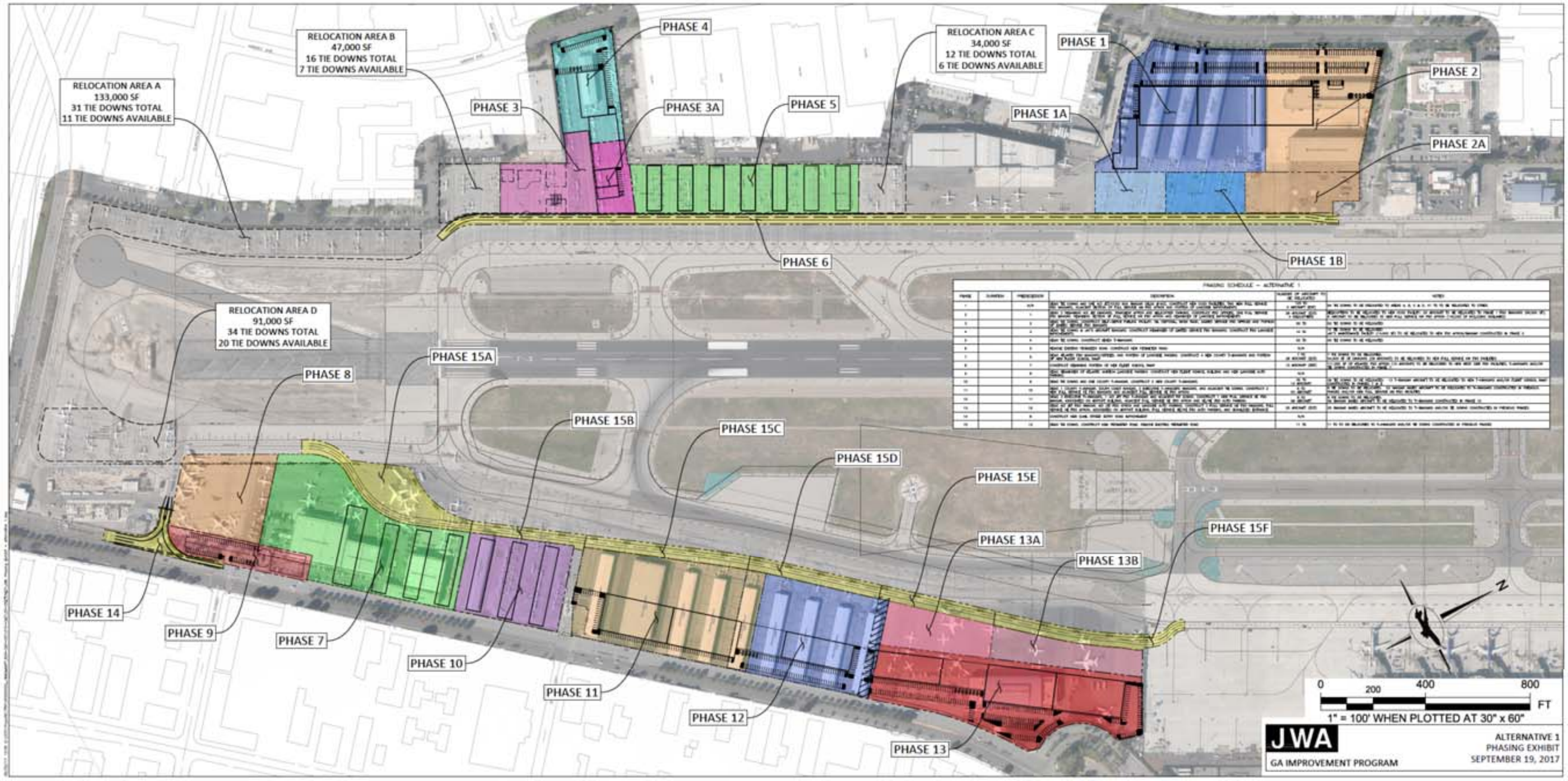
Table 9 Alternative 1 Construction Phases

PHASE	ACTIVITY	DURATION (DAYS)	FOOTPRINT	UNIT
1	Barricades, Demo and Relocations	65	191,737	SF
1	Construct New Sheriff's Office	160	20,232	SF
1	Construction of FBO	110	33,000	SF
1	Construction of Apron	35	10,500	SY
1	Construction of Park Spaces / Lighting	31	8,718	SY
1A	Barricade, Demo Phase 1 A and Utility Relocation	40	43,038	SF
1A	Subgrade and Curbing	15	43,038	SF
1A	Construction of tie-down area Pavement	30	4,782	SY
1B	Barricade, Demo Phase 1 B and Utility Relocation	40	48,384	SF
1B	Subgrade and Curbing	15	48,384	SF
1B	Construction of tie-down area Pavement	30	5,376	SY
2	Barricade, Demo and Relocations	45	156,241	SF
2	Construct Office	130	29,125	SF
2	Construct FBO	110	33,000	SF
2	Construction of Apron	35	13,800	SY
2	Construction of Park Spaces / Lighting	31	7,913	SY
3-3A	Barricade, Demo and Relocations	45	119,871	SF
3-3A	Construction of FBO	115	16,793	SF
3-3A	Construct Office	75	7,378	SF
3-3A	Construction Two (2) Aircraft Service Areas	30	12,561	SF
3-3A	Construction of Apron	35	10,633	SY
3-3A	Construction of Park Spaces / Lighting	19	106,898	SF
4	Barricade, Demo and Relocations	50	78,767	SF
4	Construction of FBO	80	25,389	SF
4	Construction of Apron	35	2,719	SY
4	Construction of Park Spaces / Lighting	31	1,949	SY
4	Construction of Park Spaces / Lighting	31	1,949	SY
5	Barricade, Demo and Relocations	30	162,414	SF
5	Construction of FBO 4	45	71,200	SF
5	Construction of Apron	35	10,135	SY
6	Barricade, Demo and Relocations	10	152,000	SF
6	Demo marking	4	134,505	SF
6	Road Relocated	45	16,889	SY
6	New Marking	6	152,000	SF

PHASE	ACTIVITY	DURATION (DAYS)	FOOTPRINT	UNIT
7	Barricade, Demo and Relocations	60	186,075	SF
7	Construction of T Hangers	88	69,200	SF
8	Barricade, Demo and Relocations	30	111,087	SF
8	Construction Trench Drains and Site Utilities	35	111,087	SF
8	Concrete	35	12,343	SY
9	Barricade, Demo and Relocations	30	53,316	SF
9	Construction of Flight School Office	75	10,000	SF
9	Construction of Park Spaces / Lighting	41	3,833	SY
9	Misc. Concrete	25	747	SY
10	Barricade, Demo and Relocations	30	129,906	SF
10	Construction of T- Hangers and Apron Paving	75	51,000	SF
10	Construction of Waste Oil Separator-Drum Storage Area	55	81,114	SF
10	Misc. Concrete	25	8,600	SY
11	Demo and Relocations	35	155,077	SF
11	Construction of FBO Hangers and Surface Repairs	81	76,000	SF
11	Misc. Concrete	25	10,743	SY
11	Construction of Park Spaces / Lighting	35	3,733	SY
12	Demo and Relocations	25	120,369	SF
12	Construction of FBO Hangars and Office	85	39,670	SF
12	Apron Concrete	45	7,967	SY
12	Construction of Park Spaces / Lighting	35	143,399	SF
13	Demo and Relocations	31	341,494	SF
13	Construction of FBO Hangers	63	103,295	SF
13	Construction of Offices	90	18,000	SF
13	Construction Set up of Customs Area	30	18,000	SF
13	Construction of Park Spaces / Lighting	50	3,333	SY
13	Construction of Parking Garage	140	175,528	SF
13	Apron Concrete	45	15,404	SY
14	Demo marking	4	26,500	SF
14	East Access Road Relocation	50	2,778	SY
14	New Marking	6	26,500	SF
15	Install Traffic Signals	60	23,572	SY
15	New Marking	1	212,148	SF

Source: AECOM, John Wayne Airport, 2017.

Figure 2 Construction Phasing – Alternative 1



Note: Sub-phases shown in the diagram may be grouped together in the construction phasing table.

Source: AECOM, John Wayne Airport, 2017.

4.3 CONSTRUCTION EMISSIONS

Emissions during construction at the Airport were calculated using the California Emissions Estimator Model (CalEEMod) program (version 2016.3.2). The CalEEMod model calculates emissions resulting from each construction activity. CalEEMod defaults were used for equipment and trip generation data. The CalEEMod output files are available in **Attachment 2 – *Computer Modeling Files***.

The Proposed Project's construction emission inventory, which accounts for the maximum annual GHG emissions for the construction of the Proposed Project, is shown in Table 10.

Table 10 GHG Construction Emissions – Proposed Project

ACTIVITY / YEAR	ANNUAL EMISSIONS (METRIC TONS PER YEAR)			
	CO_2	CH_4	N_2O	CO_2EQ
Construction - 2019	3,646	1.0	0.0	3,672
Construction - 2020	4,098	1.2	0.0	4,128
Construction - 2021	3,335	0.9	0.0	3,357
Construction - 2022	3,520	0.9	0.0	3,543
Construction - 2023	2,356	0.6	0.0	2,372
Construction - 2024	4,306	1.1	0.0	4,062
Construction - 2025	5,425	1.5	0.0	5,464
Construction - 2026	1,499	0.4	0.0	1,510
			TOTAL MT CO_2EQ	***28,108***

CO_2: Carbon Dioxide
CH_4: Methane
N_2O: Nitrous oxide
CO_2EQ: Carbon Dioxide equivalent

Note: GWP for CO_2=1; CH_4= 25; N_2O=298
Numbers may not sum as shown, due to rounding.

Source: CalEEMod, Landrum & Brown analysis, 2017.

The construction emission inventory for Alternative 1, which accounts for the maximum annual GHG emissions for the construction of the Alternative 1, is shown in Table 11.

Table 11 GHG Construction Emissions – Alternative 1

ACTIVITY / YEAR	ANNUAL EMISSIONS (METRIC TONS)			
	CO_2	CH_4	N_2O	CO_2EQ
Construction – 2019	4,079	1.2	0.0	4,108
Construction – 2020	4,148	1.2	0.0	4,178
Construction – 2021	3,335	0.9	0.0	3,357
Construction – 2022	3,999	1.0	0.0	4,025
Construction – 2023	3,421	1.0	0.0	3,446
Construction – 2024	3,427	0.9	0.0	3,450
Construction – 2025	5,483	1.5	0.0	5,521
Construction – 2026	2,288	0.6	0.0	2,304
			TOTAL MT CO_2EQ	***30,389***

CO_2: Carbon Dioxide
CH_4: Methane
N_2O: Nitrous oxide
CO_2EQ: Carbon Dioxide equivalent

Note: GWP for CO_2=1; CH_4= 25; N_2O=298
Numbers may not sum as shown, due to rounding.

Source: CalEEMod, Landrum & Brown analysis, 2017.

5.0 OPERATIONAL ACTIVITIES

As a requirement of CEQA, impacts from the Proposed Project, Alternative 1, and the CEQA-mandated No Project Alternative must be evaluated.[37] All three scenarios were evaluated by reference to the Existing (2016) Conditions for commercial operations plus the 2026 general aviation operations associated with full implementation/build-out of the Proposed Project or respective alternative. Therefore, this section evaluates the Existing plus No Project, Existing plus Proposed Project, and Existing plus Alternative 1 scenarios.

5.1 EXISTING PLUS NO PROJECT

The Existing plus No Project scenario consists of the existing 2016 commercial and the estimated 2026 general aviation operations for the No Project scenario from the *Orange County/JWA GAIP Based Aircraft Parking—Capacity Analysis and General Aviation Constrained Forecasts, November 2017*.

5.1.1 EMISSIONS SOURCES

5.1.1.1 Aircraft

Aircraft operations by type of aircraft, runway use, flight track use, and taxi time were used to estimate emissions using AEDT. The following paragraphs describe the operations data used in modeling.

Operations Data Summaries

The flight tracks and runway use developed for the Existing (2016) Conditions were used for the Existing plus No Project scenario. Runway use at John Wayne Airport is based on aircraft size with commercial aircraft and large jets using Runway 20R and smaller general aviation aircraft using Runway 20L. There is no reason to believe that this will change as it is primarily driven by the relative length of the two runways. Existing flight tracks were assumed to remain the same for the Existing plus No Project scenario modeling as any changes that could be made in the future would be speculative. Table 12 summarizes the total yearly aircraft operations by aircraft type (fleet mix) for the Existing plus No Project scenario. The commercial operations remained the same as the Existing (2016) Conditions. The operations and fleet mix for the general aviation operations was developed from the *Orange County/JWA GAIP Based Aircraft Parking—Capacity Analysis and General Aviation Constrained Forecasts, November 2017.*

[37] SCAQMD CEQA Handbook, 1993.

Table 12 Annual Aircraft Operations – Existing Plus No Project

Aircraft type	AEDT Type	Existing + No Project
LARGE AIRCRAFT		
Airbus 319-131	A319-131191_A	6,260
Airbus 320-232	A320-232202_A	2,662
Airbus 320-211	A320-211201_A	1,786
Airbus 321-232	A321-232212_A	582
Airbus 300-662R	A300-622RF46_A	560
Boeing 737-700	737700377_E	26,828
Boeing 737-700	737700377_A	24,208
Boeing 737-800	737800378_A	17,392
Boeing 756-PW	757PW572_A	2,576
Large Aircraft Subtotal		***82,854***
REGIONAL JETS		
Bombardier CRJ900	CRJ9-ER9ER_E	3,298
Embraer 170	EMB170	5,370
Regional Jets Subtotal		***8,668***
BUSINESS JETS		
Twin Engine Regional Jet	CNA55B	5,249
Twin Engine Regional Jet	CL600	4,027
Twin Engine Regional Jet	CNA525C	3,836
Twin Engine Regional Jet	LEAR35	3,623
Twin Engine Regional Jet	GIV	3,454
Twin Engine Regional Jet	CNA560XL	2,797
Twin Engine Regional Jet	CL601	2,345
Twin Engine Regional Jet	GV	2,261
Twin Engine Regional Jet	CNA750	1,836
Twin Engine Regional Jet	CNA560U	1,754
Twin Engine Regional Jet	MU3001	1,749
Twin Engine Regional Jet	CNA680	1,372
Twin Engine Regional Jet	F10062	1,157
Twin Engine Regional Jet	CNA510	1,012
Twin Engine Regional Jet	CIT3	952
Twin Engine Regional Jet	IA1125	592
Twin Engine Regional Jet	ECLIPSE500	285
Business Jets Subtotal		***38,300***
TURBO PROPS		
Commuter Prop	DHC6	3,215
Commuter Prop	CNA441	3,213
Commuter Prop	DO228	400
Commuter Prop	CNA208	2,786
Commuter Prop	DHC830	1,286
Turbo Props Subtotal		***10,900***
GENERAL AVIATION PROPS		
GA Prop	GASEPF	30,980
GA Prop	CNA172	9,890
GA Prop	GASEPV	6,895
GA Prop	BEC58P	3,053
GA Prop	CNA182	2,281
GA Prop	CNA206	1,496
GA Prop	PA28	964
GA Prop	PA31	301
Touch and Go	GASEPF	91,140
General Aviation Props Subtotal		***147,000***
HELICOPTER		
Helicopter	R44	3,719
Helicopter	SA350D	1,081
Helicopter Subtotal		***4,800***
Commercial Operations Subtotal		**91,522**
General Aviation Operations Subtotal		**201,000**
TOTAL		**292,522**

Note: Commercial Operations remain constant in each scenario. Commercial operations include the Large and Regional Jet categories.

Source: *Orange County/JWA GAIP Based Aircraft Parking—Capacity Analysis and General Aviation Constrained Forecasts, November 2017*; Landrum & Brown, 2018.

Runway Use and Flight Tracks

The flight tracks and runway use developed for the Existing (2016) Conditions were used for the Existing plus No Project scenario. Runway use at John Wayne Airport is based on aircraft size with commercial aircraft and large jets using Runway 20R and smaller general aviation aircraft using Runway 20L. There is no reason to believe that this will change as it is primarily driven by the relative length of the two runways. Existing flight tracks were assumed to remain the same for the Existing plus No Project scenario modeling as any changes that could be made in the future would be speculative.

Taxi Times

The same taxi times used in the Existing (2016) Conditions were applied to the Existing plus No Project scenario.

5.1.1.2 Auxiliary Power Units

The changes in aircraft operations and fleet mix in the Existing plus No Project scenario would result in changes to APU equipment. The AEDT was used to model APU usage at the Airport by assigning AEDT default APUs to each aircraft operation. AEDT estimated 21,646 annual hours of APU usage at the Airport for the Existing plus No Project scenario. At the time of this writing, AEDT did not have the capability to calculate GHG emissions for APUs. Therefore, appropriate emission factors were applied to the annual APU usage to calculate annual GHG emissions outside of AEDT.[38] It should be noted however that a majority of commercial APU usage is electrified at JWA. Therefore, it is likely the total emissions presented in Section 5.1.2 overestimates emissions from APUs.

5.1.1.3 Ground Support Equipment

The changes in aircraft operations and fleet mix in the Existing plus No Project scenario would result in changes to GSE. The general aviation GSE usage for the Existing plus No Project scenario was proportionately increased from the Existing (2016) Conditions by 4.3 percent, in accordance with the estimated increase in general aviation activity identified in the aviation forecast for the Existing plus No Project scenario. This increase reflects the change in general aviation operations from the Existing (2016) Conditions. It was assumed the commercial operation GSE usage would remain the same as the Existing (2016) Conditions. The percentage of GSE type by fuel type and annual operating hours used in the AEDT modeling for general aviation operations in the Existing plus No Project scenario are shown in Table 13. At the time of this writing, AEDT did not have the capability to calculate GHG emissions for GSE. Therefore, appropriate load factors and emission factors were applied to the annual GSE usage to calculate annual GHG emissions outside of AEDT.[39]

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[38] An APU with a horsepower rating from 100 to 175 was assumed. MOVES 2014a emission factor for an APU with horsepower rating from 100 to 175 for methane and carbon dioxide are 1.8 g/hr and 72,733.8 g/hr, respectively.

[39] ACRP Report 78: Airport Ground Support Equipment: Emission Reduction Strategies, Inventory, and Tutorial.

Table 13 General Aviation GSE – Existing Plus No Project

AEDT GSE TYPE	FUEL TYPE	PERCENT OF GSE TYPE USAGE	ANNUAL OPERATING HOURS
Aircraft Tractor	Diesel	44.00%	4,102
Aircraft Tractor	Electric	47.63%	4,441
Aircraft Tractor	Gasoline	8.37%	781
Cart	Electric	100.00%	130
Fuel Truck	Diesel	100.00%	4,587
GPU	Diesel	100.00%	6,255
Hydrant Truck	Electric	100.00%	104
Lavatory Truck	Electric	100.00%	759
Service Truck	Electric	100.00%	1,746
Fork Lift	Propane	100.00%	209

Source: JWA, Landrum & Brown analysis, 2018.

5.1.2 EMISSIONS INVENTORY

The GHG emissions inventory for the Existing plus No Project scenario is provided in Table 14.

Table 14 GHG Emissions Inventory – Existing Plus No Project

SOURCE	ANNUAL EMISSIONS (METRIC TONS)			
	CO_2	CH_4	N_2O	CO_2EQ
Aircraft	106,903	0.0	0.0	106,903
GSE	7,942	0.2	0.1	7,970
APU	1,566	0.04	0.00	1,567
			Total MT CO_2EQ	***116,440***

CO_2: Carbon Dioxide
CH_4: Methane
N_2O: Nitrous oxide
CO_2EQ: Carbon Dioxide equivalent

Note: GWP for CO_2=1; CH_4= 25; N_2O=298
APU and GSE usage is largely limited to commercial aircraft.

Source: AEDT version 2d, Landrum & Brown analysis, 2017.

5.2 EXISTING PLUS PROPOSED PROJECT

The Existing plus Proposed Project scenario consists of the existing 2016 commercial operations and estimated 2026 general aviation operations for the Proposed Project from the *Orange County/JWA GAIP Based Aircraft Parking—Capacity Analysis and General Aviation Constrained Forecasts, November 2017*.

5.2.1 EMISSIONS SOURCES

5.2.1.1 Aircraft

Aircraft operations by type of aircraft, runway use, flight track use, and taxi time were used to estimate emissions using AEDT. The following paragraphs describe the operations data used in the modeling.

Operations Data Summaries

Table 15 summarizes the total yearly aircraft operations by aircraft type (fleet mix) for the Existing plus Proposed Project scenario. The commercial operations remained the same as the Existing (2016) Conditions. The operations and fleet mix for the general aviation operations was developed from the *Orange County/JWA GAIP Based Aircraft Parking—Capacity Analysis and General Aviation Constrained Forecasts, November 2017.*

Runway Use and Flight Tracks

The flight tracks and runway use developed for the Existing (2016) Conditions were used for the Existing plus Proposed Project scenario. As previously discussed, runway use at John Wayne Airport is based on aircraft size with commercial aircraft and large jets using Runway 20R and smaller general aviation aircraft using Runway 20L. There is no reason to believe that this will change as it is primarily driven by the relative length of the two runways. Existing flight tracks were assumed to remain the same for the Existing plus Proposed Project scenario modeling as any changes that could be made in the future would be speculative.

Taxi Times

The same taxi times used in the Existing (2016) Conditions were applied to the Existing plus Proposed Project scenario.

Table 15 Annual Aircraft Operations – Existing Plus Proposed Project

Aircraft type	AEDT Type	Existing + Proposed Project
LARGE AIRCRAFT		
Airbus 319-131	A319-131191_A	6,260
Airbus 320-232	A320-232202_A	2,662
Airbus 320-211	A320-211201_A	1,786
Airbus 321-232	A321-232212_A	582
Airbus 300-662R	A300-622RF46_A	560
Boeing 737-700	737700377_E	26,828
Boeing 737-700	737700377_A	24,208
Boeing 737-800	737800378_A	17,392
Boeing 756-PW	757PW572_A	2,576
Large Aircraft Subtotal		***82,854***
REGIONAL JETS		
Bombardier CRJ900	CRJ9-ER9ER_E	3,298
Embraer 170	EMB170	5,370
Regional Jets Subtotal		***8,668***
BUSINESS JETS		
Twin Engine Regional Jet	CNA55B	5,537
Twin Engine Regional Jet	CL600	4,247
Twin Engine Regional Jet	CNA525C	4,046
Twin Engine Regional Jet	LEAR35	3,822
Twin Engine Regional Jet	GIV	3,644
Twin Engine Regional Jet	CNA560XL	2,951
Twin Engine Regional Jet	CL601	2,474
Twin Engine Regional Jet	GV	2,385
Twin Engine Regional Jet	CNA750	1,936
Twin Engine Regional Jet	CNA560U	1,850
Twin Engine Regional Jet	MU3001	1,845
Twin Engine Regional Jet	CNA680	1,447
Twin Engine Regional Jet	F10062	1,220
Twin Engine Regional Jet	CNA510	1,068
Twin Engine Regional Jet	CIT3	1,004
Twin Engine Regional Jet	IA1125	624
Twin Engine Regional Jet	ECLIPSE500	301
Business Jets Subtotal		***40,400***
TURBO PROPS		
Commuter Prop	DHC6	3,451
Commuter Prop	CNA441	3,449
Commuter Prop	DO228	430
Commuter Prop	CNA208	2,990
Commuter Prop	DHC830	1,380
Turbo Props Subtotal		***11,700***
GENERAL AVIATION PROPS		
GA Prop	GASEPF	23,393
GA Prop	CNA172	7,468
GA Prop	GASEPV	5,207
GA Prop	BEC58P	2,305
GA Prop	CNA182	1,722
GA Prop	CNA206	1,130
GA Prop	PA28	728
GA Prop	PA31	227
Touch and Go	GASEPF	68,820
General Aviation Props Subtotal		***111,000***
HELICOPTER		
Helicopter	R44	3,719
Helicopter	SA350D	1,081
Helicopter Subtotal		***4,800***
Commercial Operations Subtotal		**91,522**
General Aviation Operations Subtotal		**167,900**
TOTAL		**259,422**

Note: Commercial Operations remain constant in each scenario. Commercial operations include the Large and Regional Jet categories.

Source: *Orange County/JWA GAIP Based Aircraft Parking—Capacity Analysis and General Aviation Constrained Forecasts, November 2017*; Landrum & Brown, 2018.

5.2.1.2 Auxiliary Power Units

The changes in aircraft operations and fleet mix in the Existing plus Proposed Project scenario would result in changes to APU equipment. The AEDT was used to model APU usage at the Airport by assigning AEDT default APUs to each aircraft operation. AEDT estimated 21,693 annual hours of APU usage at the Airport for the Existing plus Proposed Project scenario. At the time of this writing, AEDT did not have the capability to calculate GHG emissions for APUs. Therefore, appropriate emission factors were applied to the annual APU usage to calculate annual GHG emissions outside of AEDT.[40] It should be noted however that a majority of commercial APU usage is electrified at JWA. Therefore, it is likely the total emissions presented in Section 5.2.2 overestimates emissions from APUs.

5.2.1.3 Ground Support Equipment

The changes in general aviation operations in the Existing plus Proposed Project scenario would result in changes to GSE usage. The general aviation GSE usage for the Existing plus Proposed Project scenario was proportionately decreased from the Existing (2016) Conditions by 12.9 percent, in accordance with the estimated decrease in general aviation activity identified in the aviation forecast for the Existing plus Proposed Project scenario. This decrease reflects the change in general aviation operations from the Existing (2016) Conditions. It was assumed the commercial operation GSE usage would remain the same as the Existing (2016) Conditions. The percentage of GSE type by fuel type and annual operating hours used in the AEDT modeling for general aviation operations in the Existing plus Proposed Project scenario are shown in Table 16. At the time of this writing, AEDT did not have the capability to calculate GHG emissions for GSE. Therefore, appropriate load factors and emission factors were applied to the annual GSE usage to calculate annual GHG emissions outside of AEDT.[41]

Table 16 GSE Electrification – Existing Plus Proposed Project

AEDT GSE TYPE	FUEL TYPE	PERCENT OF GSE TYPE USAGE	ANNUAL OPERATING HOURS
Aircraft Tractor	Diesel	44.00%	3,427
Aircraft Tractor	Electric	47.63%	3,710
Aircraft Tractor	Gasoline	8.37%	652
Cart	Electric	100.00%	109
Fuel Truck	Diesel	100.00%	3,832
GPU	Diesel	100.00%	5,225
Hydrant Truck	Electric	100.00%	87
Lavatory Truck	Electric	100.00%	634
Service Truck	Electric	100.00%	1,459
Fork Lift	Propane	100.00%	174

Source: JWA, Landrum & Brown analysis, 2018.

40 An APU with a horsepower rating from 100 to 175 was assumed. MOVES 2014a emission factor for an APU with horsepower rating from 100 to 175 for methane and carbon dioxide are 1.8 g/hr and 72,733.8 g/hr, respectively.

41 ACRP Report 78: Airport Ground Support Equipment: Emission Reduction Strategies, Inventory, and Tutorial.

5.2.2 EMISSIONS INVENTORY

The emission inventory from the Existing plus Proposed Project scenario is provided in Table 17.

Table 17 GHG Emissions Inventory – Existing Plus Proposed Project

SOURCE	ANNUAL EMISSIONS (METRIC TONS)			
	CO_2	CH_4	N_2O	CO_2EQ
Aircraft	107,360	0.0	0.0	107,360
GSE	7,825	0.2	0.1	7,852
APU	1,578	0.04	0.00	1,579
			Total MT CO_2EQ	***116,790***

CO_2: Carbon Dioxide
CH_4: Methane
N_2O: Nitrous oxide
CO_2EQ: Carbon Dioxide equivalent

Note: GWP for CO_2=1; CH_4= 25; N_2O=298
APU and GSE usage is largely limited to commercial aircraft.

Source: AEDT version 2d, Landrum & Brown analysis, 2017.

5.3 EXISTING PLUS ALTERNATIVE 1

The Existing plus Alternative 1 scenario consists of the existing 2016 commercial operations and estimated 2026 general aviation operations for Alternative 1 from the *Orange County/JWA GAIP Based Aircraft Parking—Capacity Analysis and General Aviation Constrained Forecasts, November 2017*.

5.3.1 EMISSIONS SOURCES

5.3.1.1 Aircraft

Aircraft operations by type of aircraft, runway use, flight track use, and taxi time were used to estimate emissions using AEDT. The following paragraphs describe the operations data used in the modeling.

Operations Data Summaries

Table 18 summarizes the total yearly aircraft operations by aircraft type (fleet mix) for the Existing plus Alternative 1 scenario. The commercial operations remained the same as the Existing (2016) Conditions. The operations and fleet mix for the general aviation operations was developed from the *Orange County/JWA GAIP Based Aircraft Parking—Capacity Analysis and General Aviation Constrained Forecasts, November 2017.*

Table 18 Annual Aircraft Operations – Existing Plus Alternative 1

Aircraft type	AEDT Type	Existing + Alternative 1
LARGE AIRCRAFT		
Airbus 319-131	A319-131191_A	6,260
Airbus 320-232	A320-232202_A	2,662
Airbus 320-211	A320-211201_A	1,786
Airbus 321-232	A321-232212_A	582
Airbus 300-662R	A300-622RF46_A	560
Boeing 737-700	737700377_E	26,828
Boeing 737-700	737700377_A	24,208
Boeing 737-800	737800378_A	17,392
Boeing 756-PW	757PW572_A	2,576
Large Aircraft Subtotal		***82,854***
REGIONAL JETS		
Bombardier CRJ900	CRJ9-ER9ER_E	3,298
Embraer 170	EMB170	5,370
Regional Jets Subtotal		***8,668***
BUSINESS JETS		
Twin Engine Regional Jet	CNA55B	5,674
Twin Engine Regional Jet	CL600	4,353
Twin Engine Regional Jet	CNA525C	4,146
Twin Engine Regional Jet	LEAR35	3,916
Twin Engine Regional Jet	GIV	3,734
Twin Engine Regional Jet	CNA560XL	3,024
Twin Engine Regional Jet	CL601	2,535
Twin Engine Regional Jet	GV	2,444
Twin Engine Regional Jet	CNA750	1,984
Twin Engine Regional Jet	CNA560U	1,896
Twin Engine Regional Jet	MU3001	1,890
Twin Engine Regional Jet	CNA680	1,483
Twin Engine Regional Jet	F10062	1,251
Twin Engine Regional Jet	CNA510	1,094
Twin Engine Regional Jet	CIT3	1,029
Twin Engine Regional Jet	IA1125	640
Twin Engine Regional Jet	ECLIPSE500	308
Business Jets Subtotal		***41,400***
TURBO PROPS		
Commuter Prop	DHC6	3,186
Commuter Prop	CNA441	3,183
Commuter Prop	DO228	397
Commuter Prop	CNA208	2,760
Commuter Prop	DHC830	1,274
Turbo Props Subtotal		***10,800***
GENERAL AVIATION PROPS		
GA Prop	GASEPF	23,519
GA Prop	CNA172	7,509
GA Prop	GASEPV	5,235
GA Prop	BEC58P	2,318
GA Prop	CNA182	1,731
GA Prop	CNA206	1,136
GA Prop	PA28	732
GA Prop	PA31	229
Touch and Go	GASEPF	69,192
General Aviation Props Subtotal		***111,600***
HELICOPTER		
Helicopter	R44	3,719
Helicopter	SA350D	1,081
Helicopter Subtotal		***4,800***
Commercial Operations Subtotal		**91,522**
General Aviation Operations Subtotal		**168,600**
TOTAL		**260,122**

Note: Commercial Operations remain constant in each scenario. Commercial operations include the Large and Regional Jet categories.

Source: *Orange County/JWA GAIP Based Aircraft Parking—Capacity Analysis and General Aviation Constrained Forecasts, November 2017*; Landrum & Brown, 2018.

Runway Use and Flight Tracks

The flight tracks and runway use developed for the Existing (2016) Conditions were used for the Existing plus Alternative 1 scenario. As previously discussed, runway use at John Wayne Airport is based on aircraft size with commercial aircraft and large jets using Runway 20R and smaller general aviation aircraft using Runway 20L. There is no reason to believe that this will change as it is primarily driven by the relative length of the two runways. Existing flight tracks were assumed to remain the same for the Existing plus Alternative 1 scenario modeling, as any changes that could be made in the future would be speculative.

Taxi Times

The same taxi times used in the Existing (2016) Conditions were applied to the Existing plus Alternative 1 scenario.

5.3.1.2 Auxiliary Power Units

The changes in aircraft operations and fleet mix in the Existing plus Alternative 1 scenario would result in changes to APU equipment. The AEDT was used to model APU usage at the Airport by assigning AEDT default APUs to each aircraft operation. AEDT estimated 21,768 annual hours of APU usage at the Airport for the Existing plus Alternative 1 scenario. At the time of this writing, AEDT did not have the capability to calculate GHG emissions for APUs. Therefore, appropriate emission factors were applied to the annual APU usage to calculate annual GHG emissions outside of AEDT.[42] It should be noted however that a majority of commercial APU usage is electrified at JWA. Therefore, it is likely the total emissions presented in Section 5.3.2 overestimates emissions from APUs.

5.3.1.3 Ground Support Equipment

The changes in general aviation operations in the Existing plus Alternative 1 scenario would result in changes to GSE usage. The general aviation GSE usage for the Existing plus Alternative 1 scenario was proportionately decreased from the Existing (2016) Conditions by 12.6 percent, in accordance with the estimated decrease in general aviation activity identified in the aviation forecast for the Existing plus Alternative 1 scenario. This decrease reflects the change in general aviation operations from the Existing (2016) Conditions. It was assumed the commercial operation GSE usage would remain the same as the Existing (2016) Conditions. The percentage of GSE type by fuel type and annual operating hours used in the AEDT modeling for general aviation operations in the Existing plus Alternative 1 scenario is shown in Table 19. At the time of this writing, AEDT did not have the capability to calculate GHG emissions for GSE. Therefore, appropriate load factors and emission factors were applied to the annual GSE usage to calculate annual GHG emissions outside of AEDT.[43]

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[42] An APU with a horsepower rating from 100 to 175 was assumed. MOVES 2014a emission factor for an APU with horsepower rating from 100 to 175 for methane and carbon dioxide are 1.8 g/hr and 72,733.8 g/hr, respectively.

[43] ACRP Report 78: Airport Ground Support Equipment: Emission Reduction Strategies, Inventory, and Tutorial.

Table 19 GSE Usage – Existing Plus Alternative 1

AEDT GSE TYPE	FUEL TYPE	PERCENT OF GSE TYPE USAGE	ANNUAL OPERATING HOURS
Aircraft Tractor	Diesel	44.00%	3,441
Aircraft Tractor	Electric	47.63%	3,725
Aircraft Tractor	Gasoline	8.37%	655
Cart	Electric	100.00%	109
Fuel Truck	Diesel	100.00%	3,848
GPU	Diesel	100.00%	5,247
Hydrant Truck	Electric	100.00%	87
Lavatory Truck	Electric	100.00%	637
Service Truck	Electric	100.00%	1,465
Fork Lift	Propane	100.00%	175

Source: JWA, Landrum & Brown analysis, 2018.

5.3.2 EMISSIONS INVENTORY

The emissions inventory for the Existing plus Alternative 1 scenario is provided in Table 20.

Table 20 GHG Emissions Inventory – Existing Plus Alternative 1

SOURCE	ANNUAL EMISSIONS (METRIC TONS)			
	CO_2	CH_4	N_2O	CO_2EQ
Aircraft	107,587	0.0	0.0	107,587
GSE	7,827	0.2	0.1	7,854
APU	1,583	0.04	0.00	1,584
			Total MT CO_2EQ	***117,026***

CO_2: Carbon Dioxide
CH_4: Methane
N_2O: Nitrous oxide
CO_2EQ: Carbon Dioxide equivalent

Note: GWP for CO_2=1; CH_4= 25; N_2O=298
APU and GSE usage is largely limited to commercial aircraft.

Source: AEDT version 2d, Landrum & Brown analysis, 2017.

5.4 IMPACT ANALYSIS

The results of the computer modeling to estimate GHG emissions resulting from the operation of the Airport under the Existing (2016) Conditions and the various "Existing plus" scenarios are provided in Table 21. The construction-related GHG emissions due to the implementation of the Proposed Project and Alternative 1 scenarios are shown in Table 22. The SCAQMD recommends that construction-related GHG emissions be summed and amortized over the life of the project, defined as 30 years, to determine significance. The resulting construction emissions were then added to the *net* operational emissions and compared to the applicable GHG significance threshold on an annual basis, shown in Table 23.

The analysis shows that the net increase in GHG emissions under the various "Existing plus" scenarios are below the SCAQMD significance threshold of 10,000 metric tons per year. Therefore, the Proposed Project would not result in a cumulatively considerable contribution to significant impacts associated with global climate change due to GHG emissions or interfere with California's ability to achieve its GHG reduction goals.

Table 21 Total Operational Emissions – Existing (2016) Conditions and "Existing Plus" Scenarios

SCENARIOS	ANNUAL OPERATIONAL EMISSIONS (METRIC TONS)
	CO_2EQ
Existing (2016) Conditions Operational Total	114,167
Existing plus No Project Operational Total	116,440
Existing plus Proposed Project Operational Total	116,790
Existing plus Alternative 1 Operational Total	117,026

Note: Numbers may not sum as shown, due to rounding.
Source: AEDT ver. 2d, CalEEMod, Landrum & Brown analysis, 2018.

There is an overall increase in GHG emissions from the Existing (2016) Conditions to the Existing plus No Project scenario due to the 4.3 percent increase in the number of general aviation operations estimated by the aviation forecast. Additionally, although the Existing plus Proposed Project and Existing plus Alternative 1 scenarios show an overall decrease in the number of general aviation operations, the increase in the number of operations conducted by business jets estimated by the aviation forecast results in an increase in GHG emissions.

Table 22 Annual Construction Emissions - Unmitigated

SCENARIOS	ANNUAL CONSTRUCTION EMISSIONS (METRIC TONS)
	CO_2EQ
2019	
Proposed Project	3,672
Alternative 1	4,108
2020	
Proposed Project	4,128
Alternative 1	4,178
2021	
Proposed Project	3,357
Alternative 1	3,357
2022	
Proposed Project	3,543
Alternative 1	4,025
2023	
Proposed Project	2,372
Alternative 1	3,445
2024	
Proposed Project	4,062
Alternative 1	3,450
2025	
Proposed Project	5,464
Alternative 1	5,521
2026	
Proposed Project	1,510
Alternative 1	2,304
Proposed Project Construction Total	**28,108**
Alternative 1 Construction Total	**30,389**
Proposed Project Amortized Construction Emissions*	***937***
Alterative 1 Amortized Construction Emissions*	***1,013***

*Based on 30-Year Project Life Per SCAQMD Significance Thresholds

Note: Numbers may not sum as shown, due to rounding.

Source: AEDT ver. 2d, CalEEMod, Landrum & Brown analysis, 2018.

Table 23 Annual Net Increase of GHG Emissions – Unmitigated "Existing Plus" Scenarios Compared to Existing (2016) Conditions

SCENARIOS	ANNUAL NET INCREASE OF EMISSIONS (METRIC TONS)
	CO_2EQ
Significance Threshold	***10,000***
Existing plus No Project[a]	2,273
Existing plus Proposed Project[b]	3,561
Existing plus Alternative 1[c]	3,872
Existing plus No Project Exceed SCAQMD Threshold?	*NO*
Existing plus Proposed Project Exceed SCAQMD Threshold?	*NO*
Existing plus Alternative 1 Exceed SCAQMD Threshold?	*NO*

Note: Numbers may not sum as shown, due to rounding;
a: Existing plus No Project Operational Total minus Existing (2016) Conditions Operational Total
b: Existing plus Proposed Project Operational Total minus Existing (2016) Conditions Operational Total plus Proposed Project Amortized Construction Emissions
c: Existing plus Alternative 1 Operational Total minus Existing (2016) Conditions Operational Total plus Alternative 1 Amortized Construction Emissions

Source: AEDT ver. 2d, CalEEMod, Landrum & Brown analysis, 2018.

5.5 ADAPTATION TO CLIMATE CHANGE

The potential for flooding and erosion associated with climate change poses a threat to communities along the California coast and there is compelling evidence that these risks will increase in the future. Data presented in *The Impacts of Sea Level Rise on the California Coast*[44] project mean sea level along the California coast will rise from 1.0 to 1.4 meters by the year 2100. Rising seas put new areas at risk of flooding and increase the likelihood and intensity of floods in areas that are already at risk.

According to the Pacific Institute, the Airport is located outside of the projected sea level rise area.[45] Furthermore, the Proposed Project and Alternative 1 would occur on currently developed land and would not increase the surface area of impermeable surfaces on the Airport. Therefore, the Proposed Project and Alternative 1 would not further contribute to flooding and an increase in intensity of floods in the areas already at risk. Thus, impacts to the surrounding environment due to the Proposed Project and Alternative 1 are not anticipated.

44 California Climate Change Center, *The Impacts of Sea Level Rise on the California Coast*, Executive Summary, March 2009.

45 Pacific Institute, *Impacts of Sea Level Rise on the California Coast*, Areas and infrastructure vulnerable to flooding and erosion, Interactive online map, 2009. Available on-line: http://www2.pacinst.org/reports/sea_level_rise/gmap.html Accessed February 2018.

6.0 GENERAL AVIATION ONLY EMISSIONS INVENTORY

The GAIP only results in changes to the general aviation-related operations, fleet mix, and facilities at JWA. The Proposed Project and alternatives do not change the number of commercial air carrier operations, fleet mix, runway use, flight tracks, or terminal area. The commercial air carrier operations at JWA are the greatest influence on the emissions while the general aviation traffic contributes only a small amount.

Therefore, for informational purposes, the following analysis only presents the general aviation-related GHG emissions at the Airport; emissions associated with commercial air carrier operations are not reflected in the inventory data that follows. The increment in GHG emissions associated with each of the scenarios studied below is identical to that identified in Section 5.0 of this report, as the only variable in the inventory that was modified in Section 6.0 is the exclusion of commercial air carrier-related emissions.

6.1 EXISTING (2016) CONDITIONS GENERAL AVIATION ONLY GREENHOUSE GAS EMISSIONS

The AEDT was used to model general aviation aircraft operations only at the Airport, along with GSE and APU usage for the Existing (2016) Conditions. The model estimates the rate of emissions of the pollutants in metric tons per year. The results of the emission inventory are provided in Table 24.

Table 24 GHG Emissions Inventory – General Aviation Only Existing (2016) Conditions

SOURCE	ANNUAL EMISSIONS (METRIC TONS)			
	CO_2	CH_4	N_20	CO_2EQ
Aircraft	12,148	0.00	0.00	12,148
GSE	686	0.02	0.01	688
APU	173	0.00	0.00	173
			Total MT CO_2EQ	***13,009***

CO_2: Carbon Dioxide
CH_4: Methane
N_2O: Nitrous oxide
CO_2EQ: Carbon Dioxide equivalent

Note: GWP for CO_2=1; CH_4= 25; N_2O=298.
APU and GSE usage is largely limited to commercial aircraft.

Source: AEDT version 2d, Landrum & Brown analysis, 2018.

6.2 NO PROJECT GENERAL AVIATION ONLY (2026) GREENHOUSE GAS EMISSIONS

The AEDT was used to model general aviation aircraft operations only at the Airport, along with GSE and APU usage for the No Project General Aviation Only (2026) scenario. The model estimates the rate of emissions of the pollutants in metric tons per year. The results of the emission inventory are provided in Table 25.

Table 25 GHG Emissions Inventory – No Project General Aviation Only (2026)

SOURCE	ANNUAL EMISSIONS (METRIC TONS)			
	CO_2	CH_4	N_20	CO_2EQ
Aircraft	14,356	0.00	0.00	14,356
GSE	715	0.02	0.01	717
APU	209	0.01	0.00	209
			Total MT CO_2EQ	***15,283***

CO_2: Carbon Dioxide
CH_4: Methane
N_2O: Nitrous oxide
CO_2EQ: Carbon Dioxide equivalent

Note: GWP for CO_2=1; CH_4= 25; N_2O=298.
APU and GSE usage is largely limited to commercial aircraft.

Source: AEDT version 2d, Landrum & Brown analysis, 2018.

6.3 PROPOSED PROJECT GENERAL AVIATION ONLY (2026) GREENHOUSE GAS EMISSIONS

The AEDT was used to model general aviation aircraft operations only at the Airport, along with GSE and APU usage for the Proposed Project General Aviation Only (2026) scenario. The model estimates the rate of emissions of the pollutants in metric tons per year. The results of the emission inventory are provided in Table 26.

Table 26 GHG Emissions Inventory – Proposed Project General Aviation Only (2026)

SOURCE	ANNUAL EMISSIONS (METRIC TONS)			
	CO_2	CH_4	N_20	CO_2EQ
Aircraft	14,813	0.00	0.00	14,813
GSE	597	0.01	0.01	599
APU	220	0.01	0.00	220
			Total MT CO_2EQ	***15,633***

CO_2: Carbon Dioxide
CH_4: Methane
N_2O: Nitrous oxide
CO_2EQ: Carbon Dioxide equivalent

Note: GWP for CO_2=1; CH_4= 25; N_2O=298.
APU and GSE usage is largely limited to commercial aircraft.

Source: AEDT version 2d, Landrum & Brown analysis, 2018.

6.4 ALTERNATIVE 1 GENERAL AVIATION ONLY (2026) GREENHOUSE GAS EMISSIONS

The AEDT was used to model general aviation aircraft operations only at the Airport, along with GSE and APU usage for the Alternative 1 General Aviation Only (2026) scenario. The model estimates the rate of emissions of the pollutants in metric tons per year. The results of the emission inventory are provided in Table 27.

Table 27 GHG Emissions Inventory – Alternative 1 General Aviation Only (2026)

SOURCE	ANNUAL EMISSIONS (METRIC TONS)			
	CO_2	CH_4	N_20	CO_2EQ
Aircraft	15,041	0.00	0.00	15,041
GSE	600	0.01	0.01	602
APU	226	0.01	0.00	226
			Total MT CO_2EQ	***15,868***

CO_2: Carbon Dioxide
CH_4: Methane
N_2O: Nitrous oxide
CO_2EQ: Carbon Dioxide equivalent
Note: GWP for CO_2=1; CH_4= 25; N_2O=298.
APU and GSE usage is largely limited to commercial aircraft.
Source: AEDT version 2d, Landrum & Brown analysis, 2018.

6.5 IMPACT ANALYSIS

The results of the computer modeling to estimate greenhouse gas emissions resulting from the operation of the Airport under the General Aviation Only Existing (2016) Conditions and the "General Aviation Only" scenarios are provided in Table 28.

Table 28 Total Operational Emissions – Existing (2016) Conditions and General Aviation Only (2026) Scenarios

SCENARIOS	TOTAL ANNUAL EMISSIONS (METRIC TONS) CO_2EQ
Existing (2016) Conditions General Aviation Only Operational Total	13,009
No Project General Aviation Only (2026) Operational Total	15,283
Proposed Project General Aviation Only (2026) Operational Total	15,633
Alternative 1 General Aviation Only (2026) Operational Total	15,868

Source: AEDT ver. 2d, Landrum & Brown analysis, 2018.

The construction-related emissions due to the implementation of the Proposed Project and Alternative 1 scenarios are provided in Table 22. The SCAQMD recommends that construction-related GHG emissions be summed over the life of the project and then amortized over 30 years to determine significance. The resulting construction emissions were then added to the *net* operational emissions of the General Aviation Only scenarios and compared to the applicable GHG significance threshold on an annual basis. The net increases of GHG emissions are shown in Table 29.

Table 29 Annual Net Increase of Emissions – Unmitigated General Aviation Only (2026) Scenarios Compared to Existing (2016) Conditions General Aviation Only

SCENARIOS	ANNUAL NET IMPACT EMISSIONS (METRIC TONS)
	CO_2EQ
SCAQMD Threshold	***10,000***
No Project General Aviation Only[a]	2,273
Proposed Project General Aviation Only[b]	3,561
Alternative 1 General Aviation Only[c]	3,872
No Project General Aviation Only Exceed SCAQMD Threshold?	*NO*
Proposed Project General Aviation Only Exceed SCAQMD Threshold?	*NO*
Alternative 1 General Aviation Only Exceed SCAQMD Threshold?	*NO*

Note: Numbers may not sum as shown, due to rounding.
a: No Project General Aviation Only (2026) Operational Total minus Existing (2016) Conditions General Aviation Only Operational Total
b: Proposed Project General Aviation Only (2026) Operational Total minus Existing (2016) Conditions General Aviation Only Operational Total plus Proposed Project Amortized Construction Emission
c: Alternative 1 General Aviation Only (2026) Operational Total minus Existing (2016) Conditions General Aviation Only Operational Total plus Alternative 1 Amortized Construction Emission
Source: AEDT ver. 2d, CalEEMod, Landrum & Brown analysis, 2018.

The analysis shows that the net increase in GHG emissions due to the construction and operation of the Proposed Project and Alternative 1 are below the SCAQMD suggested screening level significance threshold of 10,000 metric tons per year. Therefore, as with the analysis presented in Section 5.0 of this report, the Proposed Project and Alternative 1 would not result in a cumulatively considerable contribution to significant impacts associated with global climate change due to GHG emissions or interfere with California's ability to achieve its GHG reduction goals.

Again, although there is an overall decrease in general aviation aircraft that can be accommodated by the Airport under the Proposed Project and Alternative 1, there is an overall increase in GHG emissions associated with the three studied scenarios primarily due to an expected change in the type of general aviation aircraft anticipated to be operating at the Airport in 2026.

7.0 MITIGATION MEASURES

As discussed in Section 5.0 and Section 6.0, neither the Proposed Project nor Alternative 1 would result in a significant impact associated with GHG emissions. Therefore, in accordance with *CEQA Guidelines* Section 15126.4(a)(3), mitigation measures are not required to reduce the estimated GHG emissions.

It is noted, however, that mitigation and minimization measures are recommended to reduce construction-related criteria air pollutant emissions in Appendix E, Air Quality Technical Report, of the EIR. The construction mitigation and minimization measures recommended in the air quality analysis are anticipated to result in co-benefits, in the form of GHG emission reductions.

As recommended in EIR Appendix E MM-AQ-1, all Project-related, off-road construction equipment shall be required to meet the USEPA's Tier 4 emission engine standards. Tier 4 compliant engines significantly reduce NO_x and particulate matter emissions by approximately 95 percent for most construction equipment. Additionally, MN-AQ-1 recommended architectural coating applied to parking lots and roadways shall be required to use low VOC products.[46] Low VOC paint emits approximately 50 percent less VOC emissions than a non-low VOC paint. CalEEMod currently does not have the capability to estimate GHG reductions directly attributed to the implementation of these mitigation and minimization measures. However, it is anticipated the GHG emissions for the Proposed Project and Alternative 1 would be below the results presented in Table 23 and Table 29.

An additional minimization measure was recommended to reduce operation-related criteria air pollutant emissions in Appendix E, Air Quality Technical Report, of the EIR. The minimization measure recommended in the air quality analysis is expected to result in co-benefits, in the form of GHG emission reductions. The following minimization measure is recommended in Appendix E for operational emissions.

MN-AQ-2 General Aviation (GA) Fixed Base Operators (FBOs) shall employ Zero Emission Vehicle (ZEV) Ground Support Equipment (GSE) where available (e.g. tugs, water carts, lavatory carts, other ramp service equipment/vehicles) for 90% or greater of the GSE operating hours. Where ZEVs are not available, vehicles shall meet Ultra Low Emission Vehicle (ULEV) requirements. Where ULEVs are not available, and only diesel fuel engine trucks are available, the diesel-fueled truck shall comply with the On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation.

GA FBOs shall maintain monthly records regarding GSE type, make, model, year, fuel type, horsepower (if non-electric), and hours in-use. Monthly records are subject to audit and verification by JWA. These records shall be provided to JWA annually in June.

[46] Sherwin Williams, *Pro-Park Waterborne Traffic Marking Paint B97 Series*, July 2017. Available on-line: https://www.sherwin-williams.com/document/PDS/en/035777081228/ Accessed January 2018.

The minimized operation-related GHG emissions for the Proposed Project and Alternative 1 are shown in Table 30. These minimized operational emissions were then added to the construction emissions and compared to the applicable GHG significance threshold on an annual basis, as shown in Table 31.

Table 30 Total Operational Emissions – Existing (2016) Conditions and Minimized "Existing Plus" Scenarios

SCENARIOS	ANNUAL OPERATIONAL EMISSIONS (METRIC TONS)
	CO_2EQ
Existing (2016) Conditions Operational Total	114,167
Existing plus No Project Operational Total	115,795
Existing plus Proposed Project Operational Total	116,251
Existing plus Alternative 1 Operational Total	116,485

Note: Numbers may not sum as shown, due to rounding.
Source: AEDT ver. 2d, CalEEMod, Landrum & Brown analysis, 2018.

The analysis presented in Table 31 shows that the net increase in GHG emissions due the minimized Proposed Project and Alternative 1 would be further below the SCAQMD significance threshold of 10,000 metric tons per year than reported in Sections 5.0 and 6.0 of this report.

Table 31 Annual Net Increase of Emissions – Minimized Operational "Existing Plus" Scenarios Compared to Existing (2016) Condition

SCENARIOS	ANNUAL NET INCREASE OF EMISSIONS (METRIC TONS)
	CO_2EQ
SCAQMD Threshold	***10,000***
Existing plus No Project[a]	1,628
Existing plus Proposed Project[b]	3,021
Existing plus Alternative 1[c]	3,331
Existing plus No Project Exceed SCAQMD Threshold?	*NO*
Existing plus Proposed Project Exceed SCAQMD Threshold?	*NO*
Existing plus Alternative 1 Exceed SCAQMD Threshold?	*NO*

Note: Numbers may not sum as shown, due to rounding.
a: Minimized Existing plus No Project Operational Total minus Existing (2016) Conditions Operational Total
b: Minimized Existing plus Proposed Project Operational Total minus Existing (2016) Conditions Operational Total plus Proposed Project Amortized Construction Emissions
c: Minimized Existing plus Alternative 1 Operational Total minus Existing (2016) Conditions Operational Total plus Alternative 1 Amortized Construction Emissions
Source: AEDT ver. 2d, CalEEMod, Landrum & Brown analysis, 2018.

8.0 CUMULATIVE IMPACTS

In the context of CEQA, "GHG impacts are exclusively cumulative impacts; there are no non-cumulative GHG emission impacts from a climate change perspective."[47] This characterization of GHG impacts is consistent with the recognition that climate change is a global phenomenon and that GHG emissions do not result in localized impacts but rather contribute to overall atmospheric concentrations of GHGs that then influence the global climate. As discussed in Section 5.0, the Proposed Project and Alternative 1 would not result in a cumulatively considerable impact associated with estimated GHG emissions as the increment of GHG emissions attributable to implementation of the Proposed Project and Alternative 1 would be below the SCAQMD's significance threshold for GHGs.

[47] See CAPCOA, CEQA & Climate Change (January 2008), p. 35. See also SMAQMD, CEQA Guide (February 2016), p. 6-1 ["from the standpoint of CEQA, GHG impacts to global climate change are inherently cumulative"]; SJVAPCD, Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA (December 2009), p. 4 ["effects of project specific GHG emissions are cumulative"].

9.0 CONSISTENCY WITH LOCAL PLANS

Executive Order S-3-05, AB 32 and SB 32 are the primary State policies adopted for the purpose of reducing GHG emissions. Statewide regulations adopted in furtherance of those State policies, including GHG emissions standards for vehicles, are being implemented at the statewide level. For example, CARB's Mobile Source Strategy and 2017 Scoping Plan Update include actions to deploy zero-emission technologies across a broad spectrum of sources, including airport GSE and off-road construction equipment.

The JWA Climate Action Plan also establishes a framework to minimize Airport-related GHG emissions. The Plan was developed in furtherance of mitigation measures provided in the JWA Settlement Agreement Amendment EIR No. 617. As illustrated in Table 32, the Proposed Project and Alternative 1 are consistent with applicable elements of the Climate Action Plan.

Since the Project would be consistent with the JWA Climate Action Plan and would implement applicable emissions-reducing strategies identified in CARB's Mobile Source Strategy and 2017 Scoping Plan Update, to the extent required by law, the Project would not conflict with any applicable plan policy or regulation to reduce GHG emissions and impacts would be less than significant.

Table 32 Applicability to the Climate Action Plan

NO.	ITEM	CAP MEASURE	GAIP CONSISTENCY
E-1	Window Treatments	Install window awnings, sunshades or window tinting in appropriate areas	**Consistent -** Applicable components of the GAIP (e.g., new FBO facilities) shall be required to install window awnings, sunshades, window tinting or equivalent window design treatments in appropriate areas in order to reduce energy demand for conditioned air/cooling.
E-2	Cool roofs and pavements	Install light colored "cool" roofs and cool pavements in any new developments	**Consistent -** Applicable components of the GAIP (e.g., new FBO facilities) shall be required to install light colored "cool" roofs and cool pavements as appropriate in order to reduce energy demand for conditioned air/cooling.
E-3	Baggage handling system motors	Optimize the energy efficiency and control of the conveyor motors in the baggage handling system	**Consistent -** While not anticipated, applicable components of the GAIP (e.g., new FBO facilities) shall be required to optimize the energy efficiency and control of the conveyor motors in the baggage handling system as appropriate in order to reduce energy demand.
E-4	Energy efficiency retrofits	Retrofit and redevelop the existing structures and facilities to maximize energy efficiency	**Consistent -** The GAIP is consistent with this measure because it proposes to replace existing, aging general aviation facilities with new, more energy efficient general aviation facilities.
E-5	Energy efficiency lighting	Continue to install energy-efficient (LED or equivalent) lighting on the airfield, within terminal buildings, and for surface and parking lot security lighting	**Consistent -** The GAIP is consistent with this measure because it proposes to replace existing, aging general aviation facilities with new, more energy efficient general aviation facilities. In addition, applicable components of the GAIP shall be required to install energy-efficient (LED or equivalent) lighting on the airfield, within buildings, and for surface and parking lot security lighting in order to reduce energy demand.
E-6	Energy efficient equipment	Install energy efficient equipment and controls for equipment, as feasible	**Consistent -** Applicable components of the GAIP (e.g., new FBO facilities) shall be required to install energy efficient equipment and controls for equipment, as feasible in order to reduce energy demand.
E-7	Air handling unit motors and control	Install variable speed drives and optimize the control of air handling unit pumps for equipment, as feasible	**Consistent -** Applicable components of the GAIP (e.g., new FBO facilities) shall be required to install variable speed drives and optimize the control of air handling unit pumps for equipment, as feasible in order to reduce energy demand.
E-8	Energy efficient elevators and escalators	Install energy efficient elevators and escalators as the existing ones require replacement	**Consistent -** Applicable components of the GAIP (e.g., new FBO facilities) shall be required to install energy efficient elevators and escalators, if included in the project, in order to reduce energy demand.
E-9	Solar panels	Install solar panels and a battery system to support the CUP	**Not Applicable -** The GAIP addresses general aviation-related activities at JWA, and does not relate to, address or affect operation of the on-site Central Utility Plant.
E-10	Renewable energy purchases	Consider increasing the purchase and use of renewable energy	**Consistent -** Applicable components of the GAIP (e.g., new FBO facilities) shall be required to install renewable energy systems (e.g. solar) as feasible or purchase renewable energy.

NO.	ITEM	CAP MEASURE	GAIP CONSISTENCY
E-11	Third party energy efficiency	Require/support third parties/vendors to meet more stringent energy efficiency requirements	**Consistent -** JWA is requiring fixed based operators and vendors to meet stringent energy efficiency requirements equivalent of CalGreen Tier 1 or higher for applicable components of GAIP facilities.
E-12	ENERGY STAR equipment	Require/support that new equipment purchased by JWA or tenants be rated ENERGY STAR or equivalent	**Consistent -** Applicable components of the GAIP (e.g., new FBO facilities) shall be required to employ new equipment rated ENERGY STAR or equivalent to reduce energy demand.
E-13	Paperless tickets	Support the efforts of commercial air carriers to utilize paperless ticket technology	**Not Applicable -** This measure pertains to commercial air carriers, not the general aviation-related activities that are the subject of the GAIP.
E-14	Track energy use	Track energy use every 12 months to assess energy use efficiency and optimization	**Consistent -** JWA, in coordination with its' general aviation-related tenants, will monitor the energy use of development facilitated by the GAIP on an annual basis in order to assess efficiency and optimization opportunities.
AG-1	Alternative fuels for equipment	Maximize use of hybrid or alternatively fueled on-site equipment	**Consistent -** Applicable components of the GAIP shall be required to adopt GHG/Emission reduction measures for airside equipment and sources.
AG-2	Single/reduced engine taxiing	Support single/reduced engine taxiing procedures authorized by the FAA	**Not Applicable -** This measure pertains to the operational procedures used by commercial air carrier aircraft, not general aviation aircraft.
AG-3	GSE electrification	Require GSE electrification of 35 percent above 2013 baseline levels by 2021, and 50 percent increase above baseline by 2026	**Not Applicable -** This measure pertains to the operational procedures used by commercial air carrier aircraft, not general aviation aircraft.
AG-4	Anti-idling policy	Require that all tenants develop, implement, and submit to the Airport a fleet-wide, anti-idling policy for their vehicles, and rental vehicles	**Consistent -** JWA shall require that general aviation tenants develop, implement and submit a fleet-wide, anti-idling policy for vehicles used, owned and/or operated in conjunction with their tenancy.
T-1	Electric vehicle chargers	Expand installation of electric vehicle chargers in public parking structures and the employee parking lots. Provide preferential parking for low emission vehicles	**Consistent -** JWA shall require that development facilitated by the GAIP install electric vehicle charging stations at appropriate general aviation facilities, such as passenger vehicle parking areas. JWA also shall require that tenants of facilities developed under the GAIP provide preferential parking for low emission vehicles at the general aviation facilities.
T-2	Public transit opportunities	Support feasible public transit opportunities to the Airport by coordinating with OCTA, Irvine iShuttle, and MetroLink upon the request of the transit providers	**Consistent -** JWA currently supports public transit opportunities to the Airport; these same opportunities are available to general aviation users.
T-3	Bicycle Racks	Support bicycle use by Airport employees and the air traveling public by providing convenient, secure bicycle racks for use on the Airport's premises	**Consistent -** Applicable components of the GAIP (e.g., new FBO facilities) shall be required to provide convenient, secure bicycle racks, as determined appropriate to accommodate bikeriders.

NO.	ITEM	CAP MEASURE	GAIP CONSISTENCY
SW-1	Waste reduction and recycling	Increase solid waste reduction and recycling	**Consistent -** JWA shall require GAIP facilities to implement waste reduction and recycling practices that exceed or are equivalent to those currently used in the passenger terminals. GAIP tenants shall provide separate receptacles for trash, recyclable and compostable materials.
SW-2	Paperless Tickets	Support the efforts of commercial air carriers to utilize paperless ticket technology	**Not Applicable -** This measure pertains to commercial air carriers, not the general aviation-related activities that are the subject of the GAIP.
M-1	ACI-NA Environmental Benchmark Survey	Support the efforts of the Airport industry to develop AQ//GHG emission benchmarking databases by participating in the biannual ACI-NA Environmental Survey	**Consistent -** JWA shall coordinate with its general aviation-related tenants to ensure that it has the information necessary to accurately respond to the biannual ACI-NA Environmental Survey.
M-2	Improvement projects	Evaluate the effects of future Airport-related improvement projects cognizant of and informed by the resulting air quality and GHG emissions in accordance with the requirements of CEQA.	**Consistent -** A program-level EIR is being prepared to evaluate the environmental effects of the GAIP, including those associated with air quality and GHG emissions. General aviation-related development that is facilitated by the GAIP also shall comply with CEQA to ensure that the environmental effects of Airport-related improvement projects are evaluated.
M-3	Carbon offsets	Purchase carbon offset credits through an adopted program such as CAPCOA's Greenhouse Gas Reduction Exchange (Rx) Registry, of which the SCAQMD is a participating air district (www.ghgrx.org)	**Not Applicable -** Based on the information and analysis presented in the EIR, the GAIP's GHG emissions would not result in a significant impact to global climate change. Because no significant impacts would result, the purchase of carbon offset credits, as a form of mitigation is not required.

The 2016 California Green Building Standards Code (24 California Code of Regulations ["CCR"] Part 11), also known as the CALGreen Code, sets planning, design and development methods that promote energy efficiency, water efficiency and conservation, material conservation, and resource efficiency and encourages sustainable construction practices for improved environmental quality. The mandatory non-residential measures in the CALGreen Code include water efficiency and conservation regulations for water meters, plumbing fixtures and fittings, commercial kitchen equipment, and landscape irrigation (ICC 2017). CALGreen Voluntary non-residential Tier 1 requirements set higher energy and water conservation standards.

ATTACHMENT 1

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ATTACHMENT 2

COMPUTER MODELING FILES